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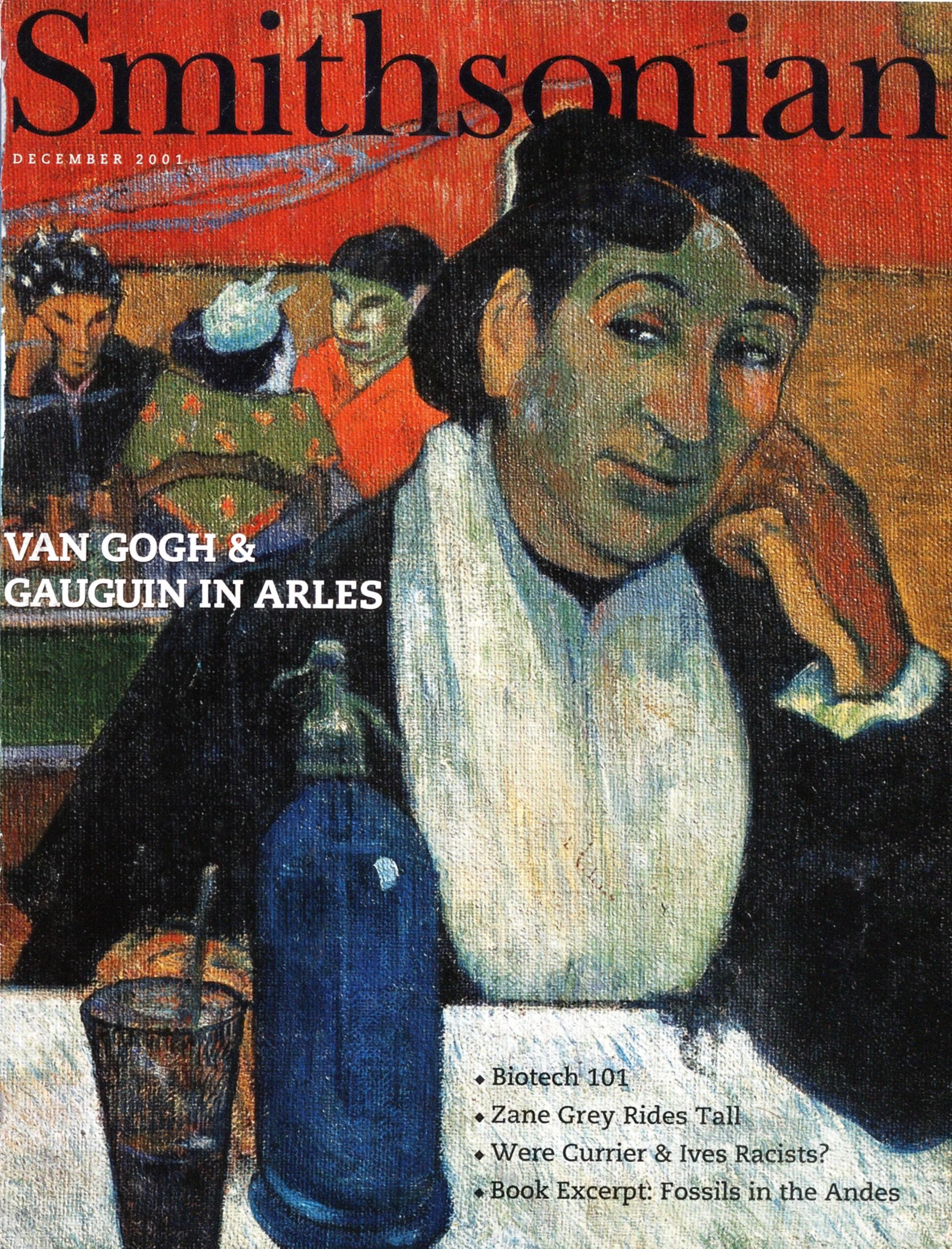

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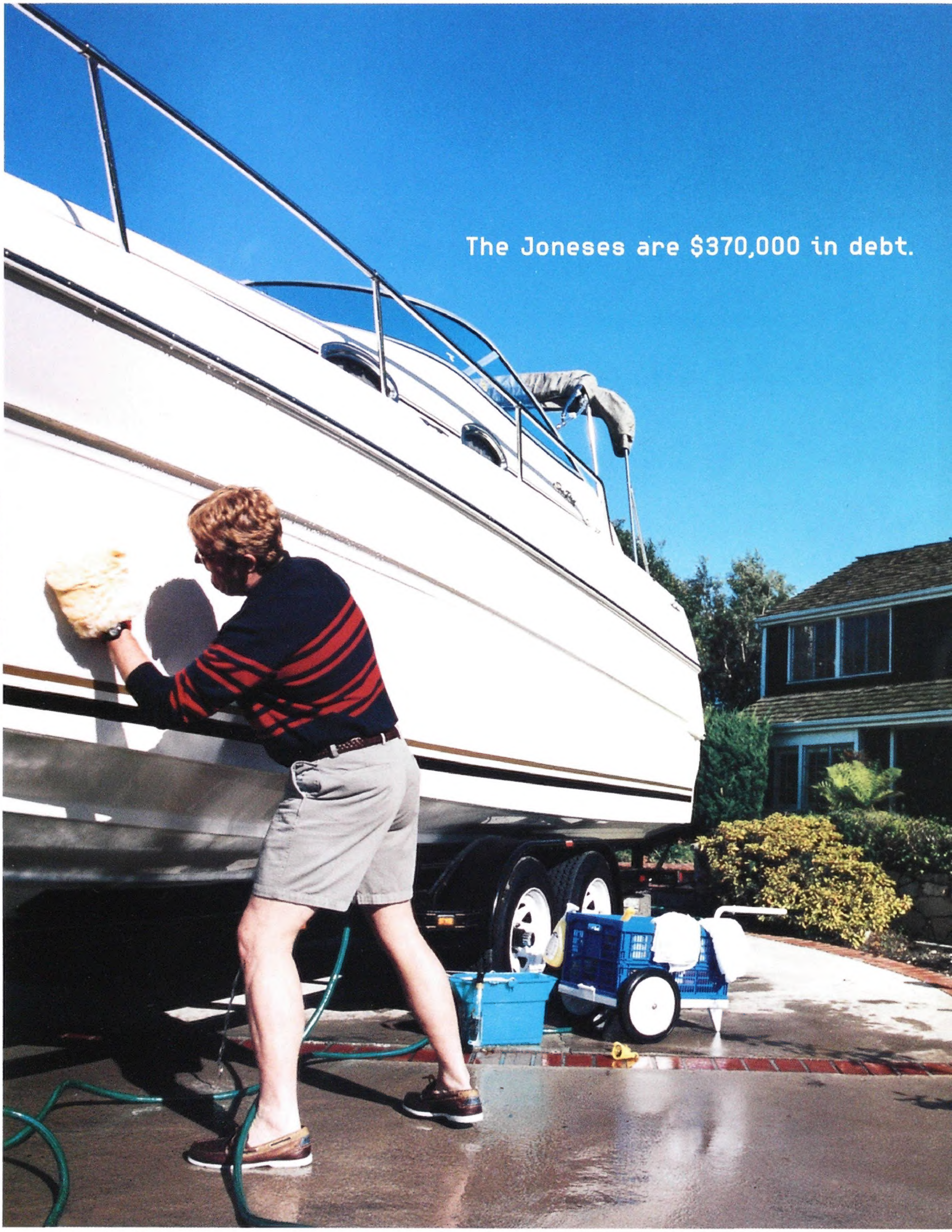

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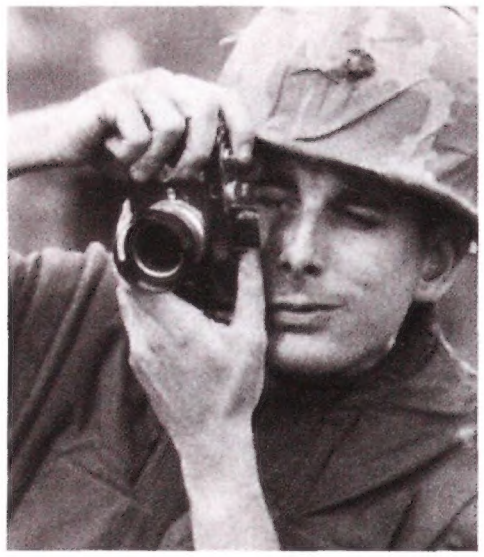

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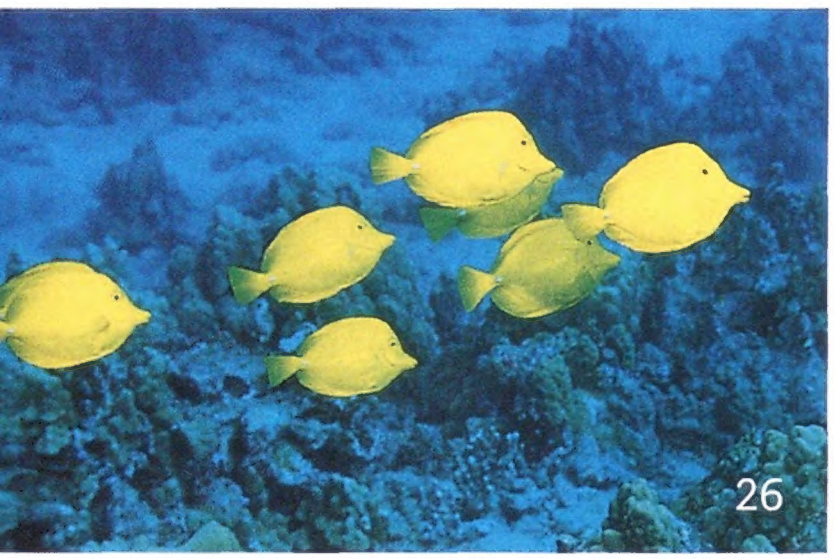

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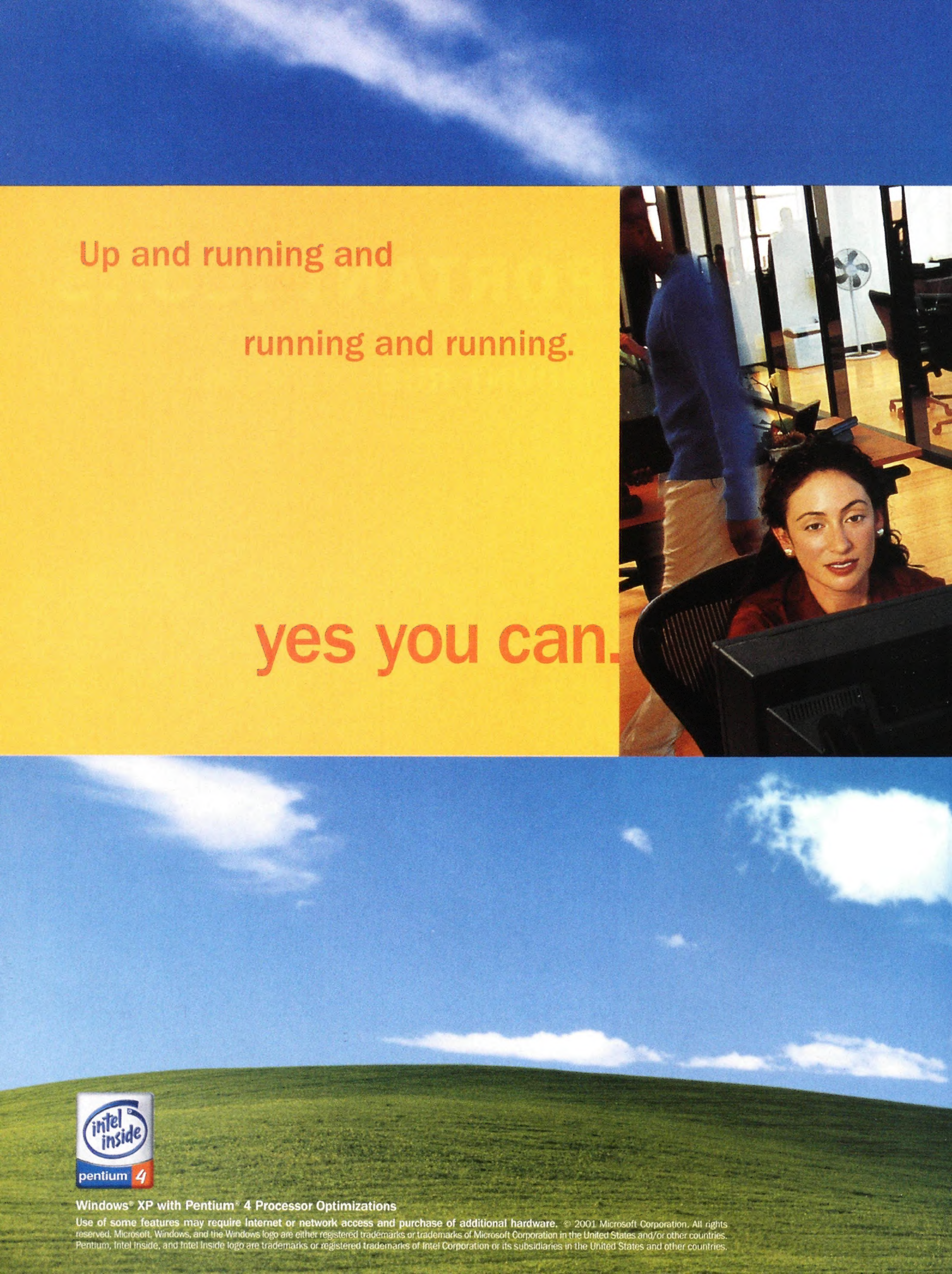
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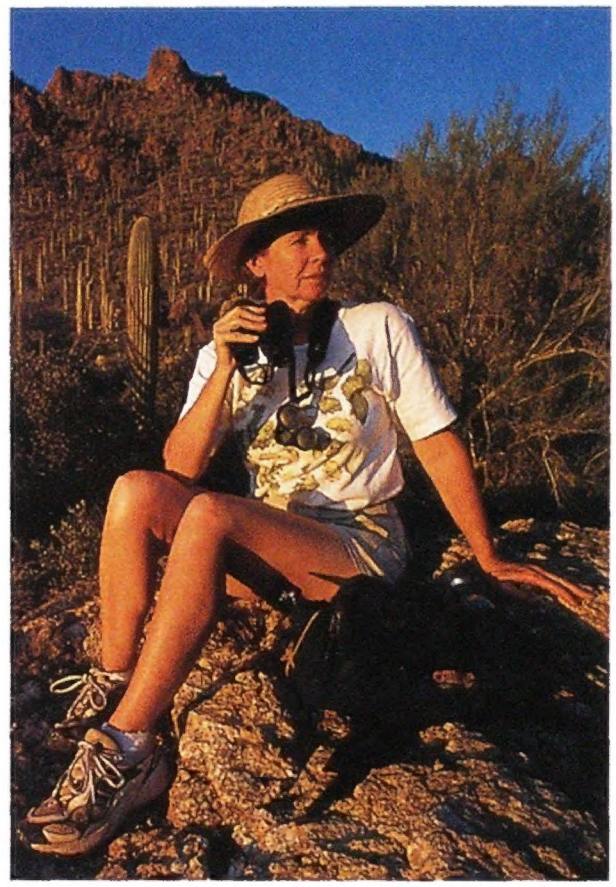
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FOR SMITHSONIAN'S WRITERS, THE CURIOUSER THE BETTER

BY CAREY WINFREY, EDITOR

FOR ANYBODY WHO LOVES LEARNING all sorts of new stuff, editing SMITHSONIAN is about the most fun you can have. Unless, that is, you count our writers and photographers, who go where the stories are. For T. Edward Nickens, tracking doyenne-of-the-desert Pinau Merlin (see "Tunnel Vision," p. 72) involved climbing cinder cones in northern Mexico, dodging border patrol agents on high-speed chases through remote cactus flats, and trailing sidewinders.

Kemper (with sock-covered anaconda): "Oddest moment?"

After all that, Nickens asked Merlin for a look inside her refrigerator.

"I've been around enough naturalists to know that there's always something unusual in the vegetable crisper," Nickens says. Merlin pulled out droppings of elk and ringtail cat. Vulture pellets. Film canisters of small bones. The bodies of a Gambel quail, rock squirrel, ground squirrel, two pocket mice, a javelina. And assorted tamales, of course. These, Nickens reports, tasted just fine.

Not every story yields culinary satisfactions. Profiling skunk researcher Jerry Dragoo ("Skunk Man," p. 108), Steve Kemper remembered that Indians and trappers ate the odoriferous critters. So Kemper asked Dragoo if he had ever tried one. "Yes," he answered, "one time." And how was it? "Not something I'd recommend," Dragoo responded cryptically.

Something else that Kemper concluded was not such a good idea: mimicking a skunk's anxiety behavior. Kemper was with Dragoo and his wife, Gwen, next to a skittish little hooded skunk named Charlie. Recalls Kemper: "Dragoo told me how skunks stomp their forefeet when they get nervous or angry, and he then imitated the movement, lifting his arms and slamming them down. Charlie watched with growing alarm. Gwen watched Charlie, also with growing alarm. 'Honey,' she said to her husband, displaying her own anxiety behavior, 'don't *do* that!'"

Kemper has written about all sorts of animals for SMITHSONIAN, from anacondas to iguanas, poisonous spiders, beluga whales, Canada geese and bighorn sheep. But, he says, the ride he took in Dragoo's car within inches of four of the skunk man's untamed friends "takes the prize for the oddest moment reporting from the field."

STEVE KEMPER

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FROM THE SECRETARY

THOUGH WHAT VISITORS SEE OF THE WORLD'S LARGEST museum and research complex—the Smithsonian's 16 museums and galleries and the National Zoological Park—is of remarkably impressive scale, what's publicly visible is by no means the whole. The Institution's physical enterprise—the working environment for 6,000 staff members and 5,000 volunteers—encompasses more than 400 buildings (nearly eight million square feet of space) in seven states, the District of Columbia and Panama.

The prodigious task of maintaining this great complex would be daunting enough if the buildings were new. But more than half of the Smithsonian's buildings and systems (for plumbing, electricity, climate control) are between 25 and 40 years old, and the foundations of our earliest buildings date from the 19th century. The cornerstone for the Smithsonian Castle was laid in 1847, and its next-door neighbor, the Arts and Industries Building, was built in 1881. The sprawling (now 1.3 million square feet) beaux arts National Museum of Natural History (NMNH) across the Mall opened in 1910. The National Zoo was designed in the 1890s by Frederick Law Olmsted and William Ralph Emerson, which gives it inestimable historic importance, but its water system also dates to the 1890s. Historic sites and buildings are both a glory and a burden: the costs of even minimal restoration, to which their significance commits us, are far higher than the costs of repair to more ordinary structures and systems.

Exterior repairs to NMNH alone will be $11 million.

In addition to the inevitable depredations of age, the Smithsonian's astonishing popularity also has consequences for the physical health of its buildings. We welcome tens of millions of visitors each year, and doors can take only so many swings, carpets so many feet, paint so many curious hands. Fall behind in the process of maintaining, restoring and revitalizing facilities, and you court disaster: "deferred maintenance" is another term for "sure trouble." In recent decades, when budgets were strained, we put off for just one more year that overdue roof repair or electrical upgrade. The result? A new internal report on our physical plant concludes that half the Institution's buildings are in unacceptable condition.

Soon after I became Secretary in 2000, I told Congress, which provides two-thirds of the Smithsonian's operating funds, that to deal with the Institution's physical needs would require an additional $500 million over the coming decade. Within a year, I had revised my estimate—to $1 billion. Congress was rightly surprised, not least because from 1996 to 2000, it had appropriated, and the Smithsonian had productively used, some $208 million in new funds for repair and restoration. So Congress asked an independent organization, the National Academy of Public Administration (NAPA), to investigate the Smithsonian's facilities program. NAPA issued its report this past July, and it confirmed the worst—which may be the best thing that could have happened.

NAPA properly took the Institution to task for letting our fundamental maintenance responsibilities get away from us. At the same time, it concluded that our internal estimates had been too low: not a billion dollars, but with inflation, a billion and a half, and perhaps more, will be needed for the repair, restoration and alteration of Smithsonian facilities in the next ten years.

Even as we stand chastened by the NAPA report, we are tremendously energized by it as well. It is an objective, external validation of our own assessments, and it has brought an unprecedented clarity to an inexorable need, which worsens the longer it is left unattended. So we intend to get on with the rescue operation—till the burnishing makes the Smithsonian an even more splendid presence on the American landscape than ever before.

LAWRENCE M. SMALL, SECRETARY

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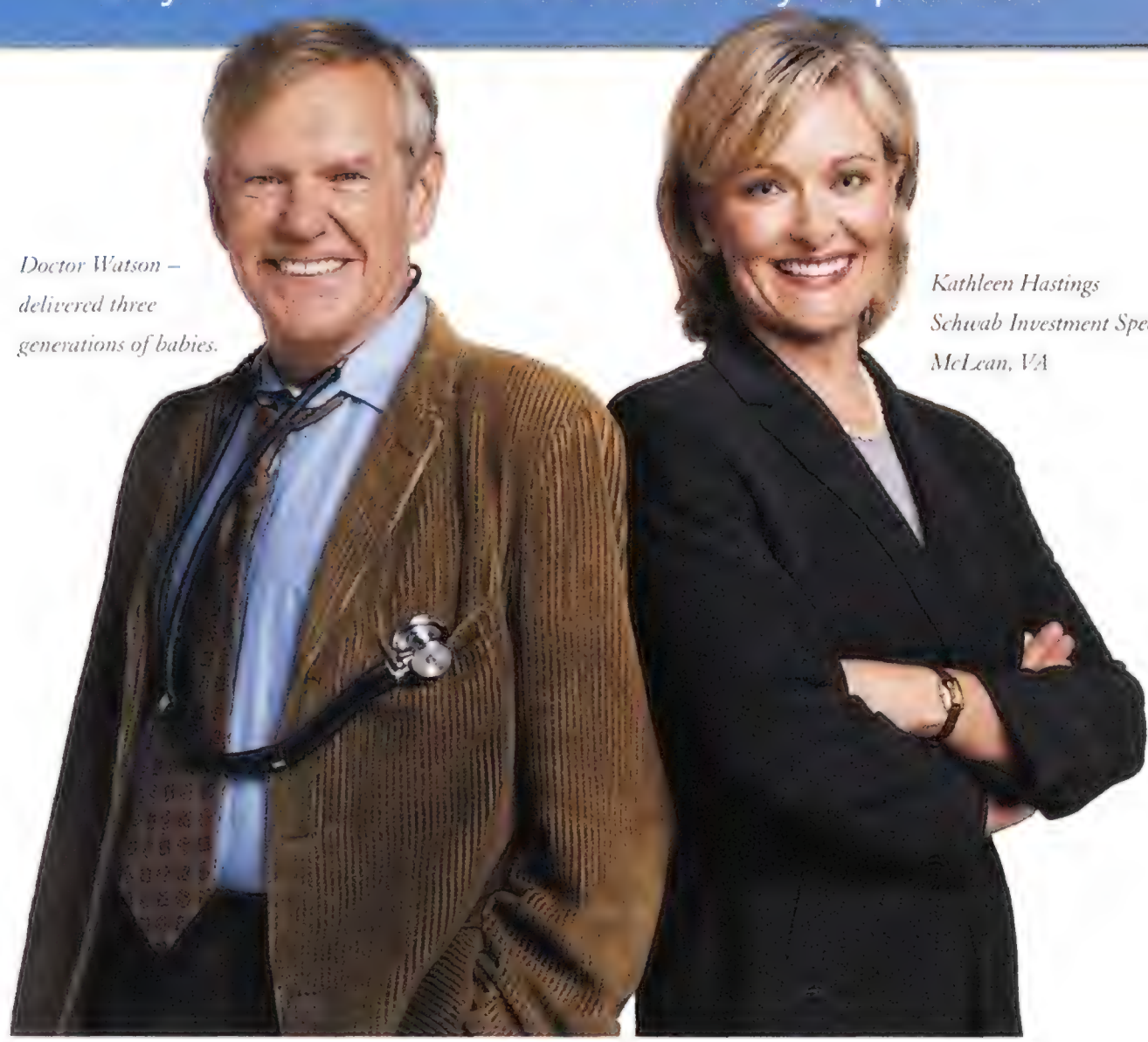

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5:25P.M. Lawrenceburg, Kentucky.
The extreme games begin.

Not the latest thing. The genuine thing.

TEDDY BEARS

I WAS STRUCK BY THE FACT THAT Wendy Mitman Clarke's October 2001 feature on teddy bears arrived in Oklahoma City a few days after September 11. When the Murrah Building was bombed in 1995, people sent hundreds of bears to help console the survivors. There were so many that dozens wound up in storage at the National Memorial here.

After the September attacks, the memorial staff sponsored a drive to send 5,000 Hope Bears back East. Within three days the goal had not only been reached but doubled, and the total climbed to more than 100,000. The bears are being sent to schools where children have been affected by the tragedy, accompanied by handwritten notes, many by schoolchildren who have given their own cherished companions to the effort.

The bear truly is "something to comfort and please the innocent." The article could not have appeared at a more opportune moment.

Jim Kyle
Oklahoma City, Oklahoma

IN THE 1940S I WORKED AT THE *Evening Star*, where teddy bear cartoonist Clifford K. Berryman went after leaving the *Washington Post*. I often had the pleasure of locating old photographs for him. Then in his 70s, he was a real teddy bear of a man, full of kindness and enthusiasm. One of my greatest treasures is a picture he made for me, featuring a crying teddy bear, when I left the picture department.

Lucy McClenon Baisden
Sun City West, Arizona

WILD TURKEY

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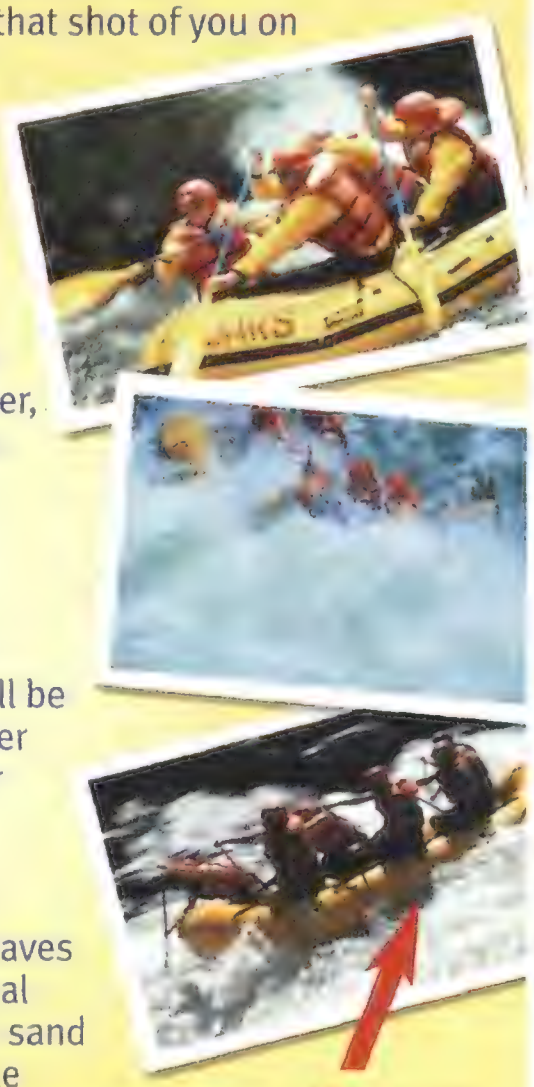

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Address:_____ City / State / Zip:_____

Send your entry to: Wild Turkey's "In the WILD Outdoors" Photo Sweepstakes, *Smithsonian* Magazine, 420 Lexington Avenue, Suite 2335, New York, NY 10170-0084

No purchase necessary. Only one entry per person. Open to residents of the United States (excluding CA, Guam, Puerto Rico, U.S. Virgin Islands or where otherwise prohibited by law) who are 21 years of age or older as of November 15, 2001. To enter, send the entry form or a 3" x 5" card indicating Name, Address, Phone and (if available) E-mail Address, along with a photo of you on the outdoor adventure of your choice. Only one entry per person, please. Entries must be received by 11:59 p.m. EST on January 31, 2002. The drawing will be conducted by Representatives of ***Smithsonian*** Magazine on or about February 21, 2002. Trip package must be used between June 1, 2002 and August 31, 2002. Certain blackout dates and restrictions may apply. Odds of winning depend upon number of eligible entries received. For Official Rules, log on to www.inquiry2000.com/rules or send a self-addressed stamped envelope to : ***Smithsonian*** Magazine "In the WILD Outdoors" Photo Sweepstakes Official Rules, ***Smithsonian*** Magazine, 420 Lexington Avenue, Suite 2335, New York, NY 10170-0084.

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POINTS OF INTEREST

STEVE KEMPER'S ARTICLE "TARNISHED Luster" conjures up a dying town with ramshackle buildings, depressed townsfolk and no hope. I live in Kellogg, and I see a different picture. We have what everyone wants—friendly neighbors, blue skies, clean air and no traffic. We have good schools and a hospital that is well staffed and close by. We have snowmobile areas, hundreds of miles of hiking trails, and waterways that offer solitude and adventure, where we see elk, deer, moose and jumping fish.

Joan F. Block
Kellogg, Idaho

WHEN THE SMELTER AT THE BUNKER Hill Mine spewed lead into the atmosphere for nearly 15 months in 1973-74, it created a toxic environment where children could not live and grow in a healthy manner.

Jerry Cobb does no one in his charge any good by saying there is no emergency health problem. Perhaps he meant that there is a chronic problem. Recently, the Ford Foundation awarded Barbara Miller, of the Silver Valley People's Coalition, $130,000 to study the effects of lead pollution that the mine owners and the health department would try to convince everyone in America does not exist.

Kristin Joyner
Director, United Parents Against Lead of North Carolina, Inc.
Whitakers, North Carolina

CLARK REFRACTORS

WHEN I WAS 5 YEARS OLD, ALVAN Clark (pronounced "Clahk" in Massachusetts) was a household god. My father owned a 3-inch telescope with a nameplate that read "Alvan Clark & Sons Corp. Type T Cambridge, Mass." and an 8.5-inch mirror signed R. Lundin. These and stacks of *Sky and Telescope* inspired him to grind his own reflecting mirror from a thick, heavy piece of glass. He rigged up a slow-moving motor, abducted my

mother's waffle iron as a mold for rubber pads, and used increasingly fine grades of Carborundum, then jewelers' rouge, to polish it. He became phobic about dust scratches. He built an aluminum barrel telescope and mounted it in the backyard. Neighborhood kids called it Mr. Richman's cannon and lobbed apples through it. Most of the time the barrel was empty or inhabited by wasps. But on clear nights and astronomical occasions, it was fitted out with lens, eyepiece and mirror, and I was hoisted up to fill my eyes with stars.

Mimi Handler
Harrisburg, Pennsylvania

BABOONS

I WAS DISAPPOINTED BY RICHARD Conniff's article "Monkey Wrench" and your cover line "Baboons: Dumb & Dumber?" Any animal whose greatest attribute is being dumb would be extinct. Baboons are the best baboons they can be. They thrive in a harsh environment. I doubt I would fare as well if I were left in the Okavango Delta with just my wits.

Bruce Campbell
Reedley, California

SAMUEL MOCKBEE

"CLASS ACT" WAS FASCINATING, BUT Doug Stewart can't simply throw in the phrase "two-story outhouse" without any explanation. How on earth does it work?

Gay Jolley
Atlanta, Georgia

The Rural Studio's facility has a composting bin on the first floor, seating on the second floor and no underground pit. Ed.

THE STUDENTS SHOULD REST EASY, and their outhouse should last a long time, sheathed in its license plates.

I live in an old homestead dating from the 1930s. The man who built it —the main house and nine outbuildings—had little money. All materials were scrounged. Truly, it is a work of art, with bottle caps under the nails on all the corrugated metal roofs. When he needed to patch, he used 1952 New Mexico license plates. They are everywhere! They are no longer shiny, but they're still doing their job.

Tina L. Bandick
Road Forks, New Mexico

ST. AUGUSTINE

IN THE SIDEBAR FOR RICHARD AND Joyce Wolkomir's "In Search of St. Augustine," the last line reads "Bien viaje." In Spanish that means "well trip." "Bien" is an adverb and "buen" an adjective meaning "good." You should have written "Buen viaje."

Galen Nixon
West Point, Utah

THE LAST PARAGRAPH SAYS THAT THE colors of Spain are white and red, but my Spanish flag is red and yellow.

Nancy Nelson
Pawling, New York

During Florida's first Spanish period, the predominant flag was the red-and-white Burgundy Cross. Ed.

WRITE TO SMITHSONIAN

Letters for consideration in this column should include your daytime telephone number, full name and postal address. Letters may be edited for clarity and length. Please send correspondence to Letters Editor, Smithsonian Magazine, MRC 951, Washington, D.C. 20560-0951 or to LettersEd@simag.si.edu.

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DAVE HAMMAN

MAJOR CONGESTION

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Brief Summary of
Prescribing Information as of November 2000

ALLEGRA-D®
(fexofenadine HCl 60 mg and pseudoephedrine HCl 120 mg)
Extended-Release Tablets

INDICATIONS AND USAGE
ALLEGRA-D is indicated for the relief of symptoms associated with seasonal allergic rhinitis in adults and children 12 years of age and older. Symptoms treated effectively include sneezing, rhinorrhea, itchy nose, palate/ and/or throat, itchy/watery red eyes, and nasal congestion.
ALLEGRA-D should be administered when both the antihistaminic properties of fexofenadine hydrochloride and the nasal decongestant properties of pseudoephedrine hydrochloride are desired (see CLINICAL PHARMACOLOGY).

CONTRAINDICATIONS
ALLEGRA-D is contraindicated in patients with known hypersensitivity to any of its ingredients.
Due to its pseudoephedrine component, ALLEGRA-D is contraindicated in patients with narrow-angle glaucoma or urinary retention, and in patients receiving monoamine oxidase (MAO) inhibitor therapy or within fourteen (14) days of stopping such treatment (see Drug Interactions section). It is also contraindicated in patients with severe hypertension, or severe coronary artery disease, and in those who have shown hypersensitivity or idiosyncrasy to its components, to adrenergic agents, or to other drugs of similar chemical structures. Manifestations of patient idiosyncrasy to adrenergic agents include: insomnia, dizziness, weakness, tremor, or arrhythmias.

WARNINGS
Sympathomimetic amines should be used judiciously and sparingly in patients with hypertension, diabetes mellitus, ischemic heart disease, increased intraocular pressure, hyperthyroidism, renal impairment, or prostatic hypertrophy (see CONTRAINDICATIONS). Sympathomimetic amines may produce central nervous system stimulation with convulsions or cardiovascular collapse with accompanying hypotension.

PRECAUTIONS
General
Due to its pseudoephedrine component, ALLEGRA-D should be used with caution in patients with hypertension, diabetes mellitus, ischemic heart disease, increased intraocular pressure, hyperthyroidism, renal impairment, or prostatic hypertrophy (see WARNINGS and CONTRAINDICATIONS). Patients with decreased renal function should be given a lower initial dose (one tablet per day) because they have reduced elimination of fexofenadine and pseudoephedrine (See CLINICAL PHARMACOLOGY and DOSAGE AND ADMINISTRATION).

Information for Patients
Patients taking ALLEGRA-D tablets should receive the following information: ALLEGRA-D tablets are prescribed for the relief of symptoms of seasonal allergic rhinitis. Patients should be instructed to take ALLEGRA-D tablets only as prescribed. **Do not exceed the recommended dose.** If nervousness, dizziness, or sleeplessness occur, discontinue use and consult the doctor. Patients should also be advised against the concurrent use of ALLEGRA-D tablets with over-the-counter antihistamines and decongestants.
The product should not be used by patients who are hypersensitive to it or to any of its ingredients. Due to its pseudoephedrine component, this product should not be used by patients with narrow-angle glaucoma, urinary retention, or by patients receiving a monoamine oxidase (MAO) inhibitor or within 14 days of stopping use of MAO inhibitor. It also should not be used by patients with severe hypertension or severe coronary artery disease.
Patients should be told that this product should be used in pregnancy or lactation only if the potential benefit justifies the potential risk to the fetus or nursing infant. Patients should be cautioned not to break or chew the tablet. Patients should be directed to swallow the tablet whole. Patients should be instructed not to take the tablet with food. Patients should also be instructed to store the medication in a tightly closed container in a cool, dry place, away from children.

Drug Interactions
Fexofenadine hydrochloride and pseudoephedrine hydrochloride do not influence the pharmacokinetics of each other when administered concomitantly.
Fexofenadine has been shown to exhibit minimal (ca. 5%) metabolism. However, co-administration of fexofenadine with ketoconazole and erythromycin led to increased plasma levels of fexofenadine. Fexofenadine had no effect on the pharmacokinetics of erythromycin and ketoconazole. In two separate studies, fexofenadine HCl 120 mg BID (twice the recommended dose) was co-administered with erythromycin 500 mg every 8 hours or ketoconazole 400 mg once daily under steady-state conditions to normal, healthy volunteers (n=24, each study). No differences in adverse events or QT_c interval were observed when subjects were administered fexofenadine HCl alone or in combination with erythromycin or ketoconazole. The findings of these studies are summarized in the following table.

Effects on Steady-State Fexofenadine Pharmacokinetics After 7 Days of Co-Administration with Fexofenadine Hydrochloride 120 mg Every 12 Hours (twice recommended dose) in Normal Volunteers (n=24)

Concomitant Drug	*$C_{max,SS}$ (Peak plasma*	*$AUC_{SS,0\text{-}12h}$ (Extent of*
Erythromycin (500 mg every 8 hrs)	+82	+109
Ketoconazole (400 mg once daily)	+135%	+164%

The changes in plasma levels were within the range of plasma levels achieved in adequate and well-controlled clinical trials.
The mechanism of these interactions has been evaluated in *in vitro*, *in situ* and *in vivo* animal models. These studies indicate that ketoconazole or erythromycin co-administration enhances fexofenadine gastrointestinal absorption. In vivo animal studies also suggest that in addition to enhancing absorption, ketoconazole decreases fexofenadine gastrointestinal secretion, while erythromycin may also decrease biliary excretion.
ALLEGRA-D tablets (pseudoephedrine component) are contraindicated in patients taking monoamine oxidase inhibitors and for 14 days after stopping use of an MAO inhibitor. Concomitant use with antihypertensive drugs which interfere with sympathetic activity (eg, methyldopa, mecamylamine, and reserpine) may reduce their antihypertensive effects. Increased ectopic pacemaker activity can occur when pseudoephedrine is used concomitantly with digitalis.
Care should be taken in the administration of ALLEGRA-D concomitantly with other sympathomimetic amines because combined effects on the cardiovascular system may be harmful to the patient (see WARNINGS).

Carcinogenesis, Mutagenesis, Impairment of Fertility
There are no animal or in vitro studies on the combination product fexofenadine hydrochloride and pseudoephedrine hydrochloride to evaluate carcinogenesis, mutagenesis, or impairment of fertility.
The carcinogenic potential and reproductive toxicity of fexofenadine hydrochloride were assessed using terfenadine studies with adequate fexofenadine exposure (area-under-the plasma concentration versus time curve [AUC]). No evidence of carcinogenicity was observed when mice and rats were given daily oral doses up to 150 mg/kg of terfenadine for 18 and 24 months, respectively. In both species, 150 mg/kg of terfenadine produced AUC values of fexofenadine that were approximately 3 times the human AUC at the maximum recommended daily oral dose in adults.
Two-year feeding studies in rats and mice conducted under the auspices of the National Toxicology Program (NTP) demonstrated no evidence of carcinogenic potential with ephedrine sulfate, a structurally related drug with pharmacological properties similar to pseudoephedrine, at doses up to 10 and 27 mg/kg, respectively (approximately 1/3 and 1/2, respectively, the maximum recommended daily oral dose of pseudoephedrine hydrochloride in adults on a mg/m² basis).
In in-vitro (Bacterial Reverse Mutation, CHO/HGPRT Forward Mutation, and Rat Lymphocyte Chromosomal Aberration assays) and in vivo (Mouse Bone Marrow Micronucleus assay) tests, fexofenadine hydrochloride revealed no evidence of mutagenicity.
Reproduction and fertility studies with terfenadine in rats produced no effect on male or female fertility at oral doses up to 300 mg/kg/day. However, reduced implants and post implantation losses were reported at 300 mg/kg. A reduction in implants was also observed at an oral dose of 150 mg/kg/day. Oral doses of 150 and 300 mg/kg of terfenadine produced AUC values of fexofenadine that were approximately 3 and 4 times, respectively, the human AUC at the maximum recommended daily oral dose in adults.

Pregnancy
Teratogenic Effects: Category C. Terfenadine alone was not teratogenic in rats and rabbits at oral doses up to 300 mg/kg; 300 mg/kg of terfenadine produced fexofenadine AUC values that were approximately 4 and 30 times, respectively, the human AUC at the maximum recommended daily oral dose in adults.
The combination of terfenadine and pseudoephedrine hydrochloride in a ratio of 1:2 by weight was studied in rats and rabbits. In rats, an oral combination dose of 150/300 mg/kg produced reduced fetal weight and delayed ossification with a finding of wavy ribs. The dose of 150 mg/kg of terfenadine in rats produced an AUC value of fexofenadine that was approximately 3 times the human AUC at the maximum recommended daily oral dose in adults. The dose of 300 mg/kg of pseudoephedrine hydrochloride in rats was approximately 10 times the maximum recommended daily oral dose in adults on a mg/m² basis. In rabbits, an oral combination dose of 100/200 mg/kg produced decreased fetal weight. By extrapolation, the AUC of fexofenadine for 100 mg/kg orally of terfenadine was approximately 10 times the human AUC at the maximum recommended daily oral dose in adults. The dose of 200 mg/kg of pseudoephedrine hydrochloride was approximately 15 times the maximum recommended daily oral dose in adults on a mg/m² basis.
There are no adequate and well-controlled studies in pregnant women. ALLEGRA-D should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.
Nonteratogenic Effects. Dose-related decreases in pup weight gain and survival were observed in rats exposed to an oral dose of 150 mg/kg of terfenadine; this dose produced an AUC of fexofenadine that was approximately 3 times the human AUC at the maximum recommended daily oral dose in adults.

Nursing Mothers
It is not known if fexofenadine is excreted in human milk. Because many drugs are excreted in human milk, caution should be used when fexofenadine hydrochloride is administered to a nursing woman. Pseudoephedrine hydrochloride administered alone distributes into breast milk of lactating human females. Pseudoephedrine concentrations in milk are consistently higher than those in plasma. The total amount of drug in milk as judged by AUC is 2 to 3 times greater than the plasma AUC. The fraction of a pseudoephedrine dose excreted in milk is estimated to be 0.4% to 0.7%. A decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother. Caution should be exercised when ALLEGRA-D is administered to nursing women.

Pediatric Use
Safety and effectiveness of ALLEGRA-D in pediatric patients under the age of 12 years have not been established.

Geriatric Use
Clinical studies of ALLEGRA-D did not include sufficient numbers of patients aged 65 and older to determine whether they respond differently from younger patients. Other reported clinical experience has not identified differences in responses between the elderly and younger patients, although the elderly are more likely to have adverse reactions to sympathomimetic amines. In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy.
The pseudoephedrine component of ALLEGRA-D is known to be substantially excreted by the kidney, and the risk of toxic reactions to this drug may be greater in patients with impaired renal function. Because elderly patients are more likely to have decreased renal function, care should be taken in dose selection, and it may be useful to monitor renal function.

ADVERSE REACTIONS
ALLEGRA-D
In one clinical trial (n=651) in which 215 patients with seasonal allergic rhinitis received the 60 mg fexofenadine hydrochloride/120 mg pseudoephedrine hydrochloride combination tablet twice daily for up to 2 weeks, adverse events were similar to those reported either in patients receiving fexofenadine hydrochloride 60 mg alone (n=218 patients) or in patients receiving pseudoephedrine hydrochloride 120 mg alone (n=218). A placebo group was not included in this study.
The percent of patients who withdrew prematurely because of adverse events was 3.7% for the fexofenadine hydrochloride/pseudoephedrine hydrochloride combination group, 0.5% for the fexofenadine hydrochloride group, and 4.1% for the pseudoephedrine hydrochloride group. All adverse events that were reported by greater than 1% of patients who received the recommended daily dose of the fexofenadine hydrochloride/pseudoephedrine hydrochloride combination are listed in the following table.

Adverse Experiences Reported in One Active-Controlled Seasonal Allergic Rhinitis Clinical Trial at Rates of Greater than 1%

Adverse Experience	60 mg Fexofenadine Hydrochloride/120 mg Pseudoephedrine Hydrochloride Combination Tablet Twice Daily (n=215)	Fexofenadine Hydrochloride 60 mg Twice Daily (n=218)	Pseudoephedrine Hydrochloride 120 mg Twice Daily (n=218)
[illegible]	13.0%	11.5%	17.4%
Insomnia	12.6%	3.2%	13.3%
Nausea	7.4%	0.5%	5.0%
[illegible]	2.8%	0.5%	5.5%
[illegible]	2.8	0.5%	0.9%
[illegible]	2.4	1.8%	0.5%
[illegible]	1.9	0.0%	3.2%
Agitation	1.9%	0.0%	1.4%
Back Pain	1.9%	0.5%	0.5%
Palpitation	1.9%	0.0%	0.9%
Nervousness	1.4%	0.5%	1.8%
Anxiety	1.4%	0.0%	1.4%
Upper Respiratory Infection	1.4%	0.9%	0.9%
Abdominal Pain	1.4%	0.5%	0.5%

Many of the adverse events occurring in the fexofenadine hydrochloride/pseudoephedrine hydrochloride combination group were adverse events also reported predominately in the pseudoephedrine hydrochloride group, such as insomnia, headache, nausea, dry mouth, dizziness, agitation, nervousness, anxiety, and palpitation.

Fexofenadine Hydrochloride
In placebo-controlled clinical trials, which included 2461 patients receiving fexofenadine hydrochloride at doses of 20 mg to 240 mg twice daily, adverse events were similar in fexofenadine hydrochloride and placebo-treated patients. The incidence of adverse events, including drowsiness, was not dose related and was similar across subgroups defined by age, gender, and race. The percent of patients who withdrew prematurely because of adverse events was 2.2% with fexofenadine hydrochloride vs 3.3% with placebo.
Events that have been reported during controlled clinical trials involving seasonal allergic rhinitis and chronic idiopathic urticaria patients with incidences less than 1% and similar to placebo and have been rarely reported during postmarketing surveillance include: insomnia, nervousness, and sleep disorders or paroniria. In rare cases, rash, urticaria, pruritus and hypersensitivity reactions with manifestations such as angioedema, chest tightness, dyspnea, flushing and systemic anaphylaxis have been reported.

Pseudoephedrine Hydrochloride
Pseudoephedrine hydrochloride may cause mild CNS stimulation in hypersensitive patients. Nervousness, excitability, restlessness, dizziness, weakness, or insomnia may occur. Headache, drowsiness, tachycardia, palpitation, pressor activity, and cardiac arrhythmias have been reported. Sympathomimetic drugs have also been associated with other untoward effects such as fear, anxiety, tenseness, tremor, hallucinations, seizures, pallor, respiratory difficulty, dysuria, and cardiovascular collapse.

Prescribing Information as of November 2000

Aventis Pharmaceuticals Inc.
Kansas City, MO 64137 USA
US Patents 4,254,129; 5,375,693; 5,578,610
www.allegra.com
alldb1100Ab

1. **Which Allegra product did you purchase with this offer?**
( ) Allegra-D (for congestion) ( ) Other Allegra _____ mg

2. **Would you like to be reminded to refill your Allegra prescription?**
( ) Yes ( ) No

3. **When did you fill your Allegra prescription?**
____/____/_____

4. **When do you anticipate filling your next prescription?**
____/____/_____

5. **What allergy symptoms do you suffer from?**
( ) Runny nose ( ) Stuffy nose ( ) Nasal Congestion
( ) Red/itchy/watery eyes ( ) Itchy nose
( ) Itchy throat ( ) Sneezing

6. **When are you most affected by your seasonal allergies? (Check all that apply)**
( ) Spring ( ) Summer ( ) Fall ( ) Winter

7. **How are you currently treating your allergies? (Check all that apply)**
( ) Prescription medication
( ) Over the counter medication
( ) Not currently treating

8. **Out of the 365 days in a year how many days do you suffer from your allergies?**
( ) 0 – 30 days (1 month) ( ) 31 – 60 days (2 months)
( ) 61 – 90 days (3 months) ( ) 91 – 120 days (4 months)
( ) 121 – 180 days (5-6 months) ( ) 181 – 240 days (7-8 months)
( ) 241 – 300 days (9-10 months) ( ) 301 – 365 days (year round)

9. **Out of the 365 days in a year how many days do you take prescription medication for your allergies?**
( ) 0 – 30 days (1 month) ( ) 31 – 60 days (2 months)
( ) 61 – 90 days (3 months) ( ) 91 – 120 days (4 months)
( ) 121 – 180 days (5-6 months) ( ) 181 – 240 days (7-8 months)
( ) 241 – 300 days (9-10 months) ( ) 301 – 365 days (year round)

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The Thousand-Yard Stare

UPI PHOTOGRAPHER FRANK JOHNSTON found himself facedown on the terra-cotta floor of a Catholic church in Nha Tho An Hoa, Vietnam, as a fierce barrage of enemy fire hit the building. It was May 15, 1967. "I looked up and saw a Marine with what they call the thousand-yard stare," Johnston recalls, "and I lifted my Leica and snapped his picture. The soldier's gaze never left my lens." The resulting image made the front pages of newspapers across the United States the next day. As the shelling eased, the Marine and the photographer wordlessly carried the wounded to safety, but Johnston never got the young man's name.

INDELIBLE IMAGES

Then, in 1986, Johnston was contacted by Robert Sutter, who was sure that the photograph was of his brother Richard, a young Marine later killed in combat. In 1998 Johnston and Sutter traveled to Vietnam to col-

FRANK JOHNSTON/UPI/CORBIS-BETTMANN

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laborate on a three-part series for the *Washington Post* about Sutter's quest to know the brother who died when he was only 13. The Sutter family and photographic experts were convinced the picture was of Richard.

But in August 1998, shortly after the *Post* series ran, Johnston got a call from Michael W. Tripp of Barrington, Rhode Island. "Mike told me that he was the Marine in the picture. He described details of that day in the church. Such a feeling of relief came over me. I realized that he's alive, he's really alive."

Tripp and Johnston (at Tripp's daughter's wedding last July) are good pals. Tripp lives in Rhode Island, Johnston in Virginia.

But why had Tripp waited so long to step forward? He had seen the photograph even before leaving Vietnam. "My wife, Ella, sent it to me in one of her letters. It was everywhere," Tripp recalls. When he returned to the United States, Tripp says he "tried to call Johnston at UPI, but they told me he was dead." It was not until three decades later, when the Learning Channel used the photograph in a 1998 advertisement, that Tripp learned otherwise. He called to request a copy and the channel's Kirstie McGuire said, "If you're the guy in the picture, the photographer would want to talk to you." When Tripp told her the photographer was dead, she said, "No he's not. I just talked to him." Soon the two men were reunited in Rhode Island. "As soon as I saw him I knew he was the guy," recalls Johnston, now 60.

Mike Tripp wasn't even supposed to be in the church that day, and the haunting expression Johnston captured on film reflected the harrowing ordeal the Marine had just endured. The day before, the 20-year-old medevac crew chief had been manning one of the helicopter's machine guns when the chopper was shot down. Uninjured, Tripp unloaded casualties, supplies and ammunition.before being pinned down with a battalion of Marines trying to make their way toward cover in the church. "We were getting pounded by two NVA battalions, and the napalm was so close I could feel the heat," Tripp, now 54, remembers. "I had been up for 40 hours when Frank took that picture."

The photograph has become a talisman of sorts. Not only have Johnston and Tripp become close friends, but Rob Sutter had a chance to honor his brother at the place where he died. News stories about the photograph led to a reunion of the men who survived huddled together in the church. "I never thought anything good would come from such a terrible time," says Johnston, "but I'm glad I took that picture and that Mike and Rob and their families became part of my life." —*Angela M. Pleasants*

After photographing Tripp, Johnston (above) and Tripp helped evacuate wounded Marines (left) from An Hoa church.

STEVE LAURENCO/MARE STUDIOS; FRANK JOHNSTON/UPI/CORBIS-BETTMANN; USMC

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PHENOMENA & CURIOSITIES

Something's Fishy

SCIENTISTS ARE TRYING TO FATHOM WHY HAWAII'S FISH POPULATION IS DECLINING

BY BERNICE WUETHRICH

Hawaii has a problem. The islands' fish—one of the state's most precious resources—are disappearing. The proportion of adults seen in catch reports for one valuable (and delicious) species of bottom fish, ehu, is down to 10 percent of its levels of 50 years ago, and a second bottom fish, onaga, has faced a similarly dramatic decline. Reef fish are also in decline. In 1999, Brian Tissot, a marine ecologist at Washington State University, found that in areas targeted by aquarium collectors, populations of eight of the most popular species had fallen by anywhere from 38 to 57 percent.

Slowly, Hawaii is restricting fishing and the collecting of aquarium fish from certain areas. But it is one thing to draw boundaries and another to know they are doing their job. All over the world, marine biologists are tackling a host of questions: Where should reserves be located? How big should they be? The answers depend, in part, on the fish themselves: How far do they travel? Where do they spawn? What habitats do they prefer? To find answers, scientists in Hawaii are monitoring fish populations, tracking their movements, and using sonar and submersibles to home in on critical habitats.

Yellow tang, which maintain their brilliant hues in captivity, constitute about half of all the aquarium fish caught in Hawaii's troubled waters in recent years.

D.R. SCHRICHTE

THE FIRST STOP OF BILL WALSH'S research boat is Keopuka, an area that allows both fishing and aquarium collecting. Of all the fish on the reef, the neon-lemon yellow tang is the flashiest. A favorite among collectors, yellow tang accounted for almost half of the more than 406,098 aquarium fish reported caught in Hawaii in 1999. Walsh calls it an indicator species, one that suggests how other aquarium favorites are impacted. In stores on the mainland, yellow tang retail for anywhere from $15 to $40 per fish. Less common species sell for more. A Hawaiian dragon moray eel, for example, can fetch up to $600.

Walsh, who works for the state Division of Aquatic Resources, is monitoring 23 ocean sites on the west coast of the Big Island of Hawaii, the main source of aquarium fish collected in the state. He and his team visit each site every other month, counting and recording every fish they see in four 100-square-meter areas. For key species, such as the yellow tang, they also note size, and keep a special watch for baby fish, known as recruits.

Unlike freshwater tropical fish, which are cultivated in tanks, most ornamental saltwater fish are caught in tropical reefs. In Hawaii, divers often herd fish into large nets, then use hand nets to scoop them into buckets. Hawaiian collector David Dart says that in good weather, an average diver can pull in 100 to 150 yellow tang a day. On other reefs around the world, collecting is more aggressive: fishermen use cyanide to stun fish, making them easy to scoop up.

The monitored sites include areas protected for a minimum of ten years that prohibit collecting, fishing or both, recently restricted areas closed only to aquarium collecting, and those open to all fishing. Walsh's numbers are beginning to detect trends. Three years into a five-year study, he has found that yellow tang is no longer declining in the newly

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Popular snorkeling spot Hanauma Bay is among Hawaii's most restrictive marine reserves, prohibiting all fishing, collecting and boating.

protected areas but continues to decline in open areas.

Aquarium collecting is not the only threat to reef fish. Overfishing, warming oceans and pollution from human development all threaten both the reefs themselves and the fish that feed off them. On the day I drove to Hanauma Bay, a Marine Life Conservation District on Oahu and Hawaii's most famous snorkeling spot, the beach was oddly empty except for police officers. It was closed because a broken pipe was spewing sewage over the reef.

In his surveys, Walsh also counts the baby recruits in protected and unprotected areas. The fact that he has yet to detect much of a difference worries him. "Without an increase in recruitment, the reserves won't realize their full potential," he says.

On another day, off the Maui coast, the sea is calm and so deeply blue that the sky pales in comparison. Diving just underneath the waves, you can hear the songs of humpback whales. Chris Kelley and his crew are fishing for onaga and ehu, which live at depths of up to 1,000 feet. The researchers record the location of every fish reeled in and correlate that information with seafloor images they get from a sonar fish finder. They note each individual's sex, length and weight, then throw it back. These fishing trips, combined with observations made in submersible dives, are painting a picture of the lives of these little-known species.

Kelley has found that adult fish prefer craggy outcrops, while the young seem to hover over lower relief outcrops. Ehu live closer to the bottom, while onaga school several meters above it. Kelley has surveyed bottom fish habitat throughout the main Hawaiian Islands, and in several

Yellowstripe goatfish swim daily between resting areas in reefs and feeding grounds.

months, he will present his recommendations for Hawaii's 19 bottom fish reserves to the state government. The areas were set up with scant knowledge of the type and location of critical fish habitat. Now, Kelley's data shows that at least two of the reserves are misplaced, lacking the jagged topography the fish call home.

In Pupukea on the north shore of Oahu, I follow Carl Meyer, a graduate student at the University of Hawaii, into the water. He shows me how easy it is to catch fish at night, barehanded. Shine a light into their eyes and they freeze like deer on a road. He grabs a striped convict tang. In one study, Meyer caught dozens of fish, tagged them with ultrasonic transmitters and released them. Then, to learn their movement patterns, he paddled after them in his hydrophone-equipped kayak.

He discovered that the three species he tracked (blue spine unicorn fish, yellowstripe goatfish and blue jack) all had well-defined home ranges. With the regularity of bank employees, they commuted daily between their sleeping areas in the reef and their feeding grounds. While unicorn fish stayed within the reserve, the goatfish and jack had home ranges three times the reserve size, exposing them to daily danger. Meyer concluded that tripling the reserve's size, which is currently a mere tenth of a square mile, would protect these mobile species.

In a statement issued last autumn, 161 of the nation's leading marine scientists suggested that reserves strung together like pearls would provide maximum protection, reseeding each other as well as the nearby fishing areas. Designing optimal reserves therefore requires knowledge of current patterns, larval transport routes and fish movement—there is still much left to learn.

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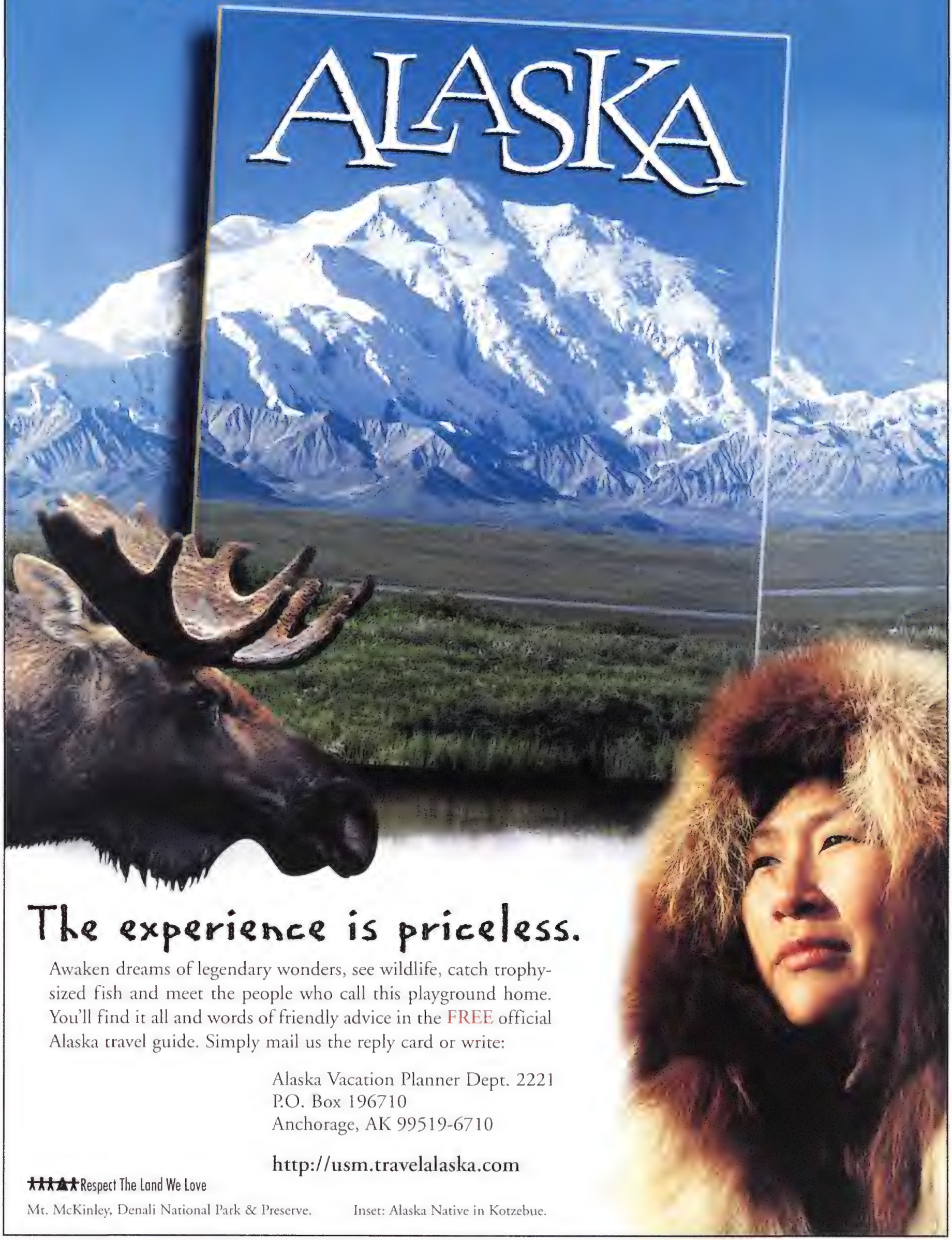

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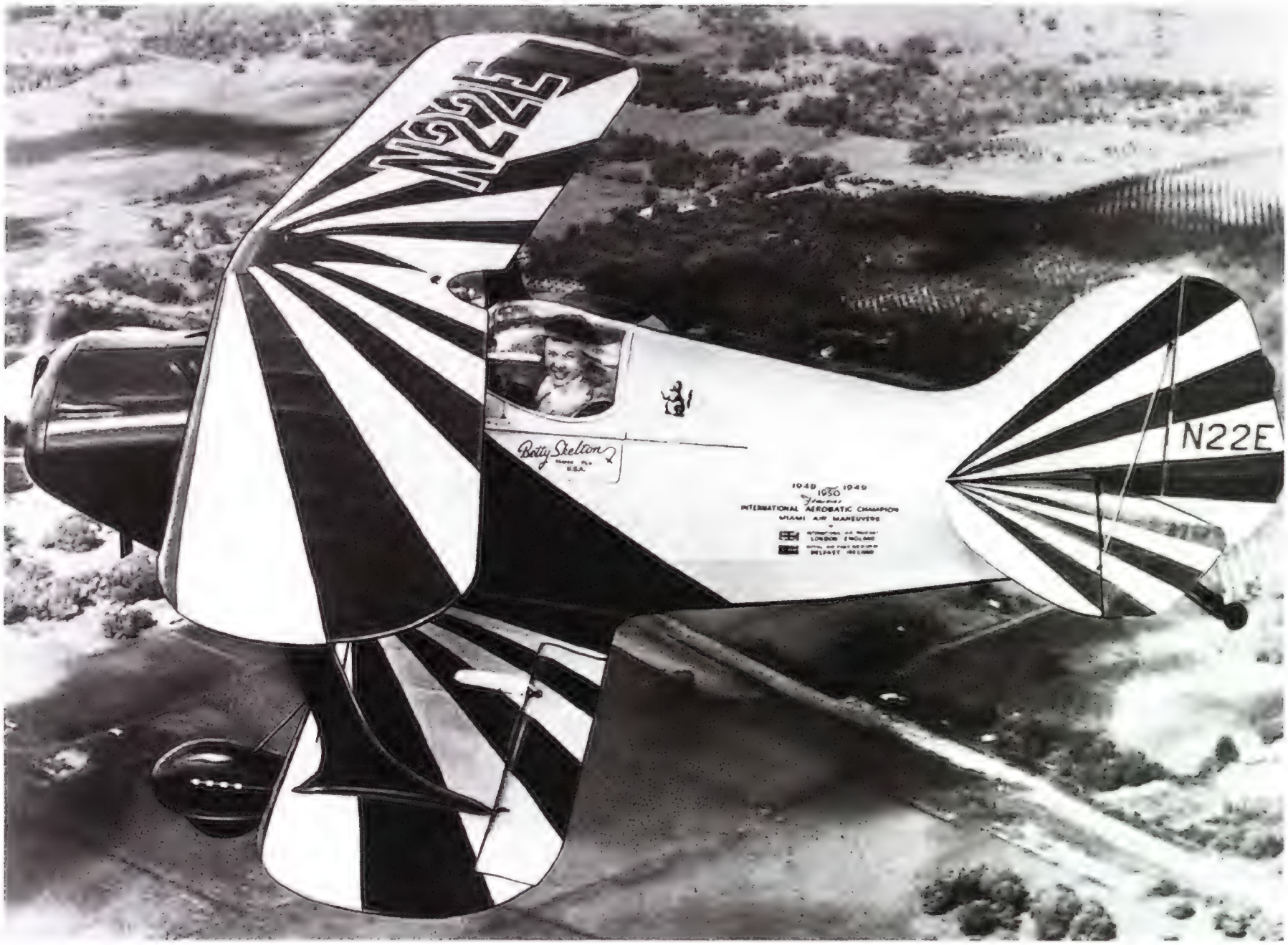
Mt. McKinley, Denali National Park & Preserve. Inset: Alaska Native in Kotzebue.

BOWING TO TRADITION

At the Kubang Kerian Mosque on Kota Bharu, on Malaysia's religiously conservative east coast, women wearing white prayer shawls, or *mukenahs*, follow the Koran's dictate that prayer is a duty incumbent on the faithful. Children sometimes accompany their mothers to the mosque, where a special area is set aside for women, whose modesty would be compromised—were they to pray among men—by the ritual kneeling and bowing required of all Muslims. (Contrary to popular belief, the Koran does not stipulate that women must be secluded.) In his timely new book, *Living Faith*, American photographer Steve Raymer says his goal in documenting the Muslim revival that spans Southeast Asia was "to put a human face on Islam."



The Little Plane That Could

A PETITE, PAGEBOY-COIFFED WOMAN GAZES intently at a small red-and-white biplane at Smithsonian's National Air and Space Museum. In her casual pantsuit, she could easily be mistaken for a bemused tourist.

"It's beautiful," she murmurs. Then, stepping adroitly behind the velvet exhibition ropes, she strokes the shiny skin of the plane, called *Little Stinker*. "It looks exactly like it did when I flew it in the late 1940s."

AROUND THE MALL

Betty Skelton, a spunky 75-year-old, knows every inch of the hand-built Pitts S-1C, having performed hundreds of daredevil feats in it during her six-year career as an aerobatic pilot. Skelton soared to fame and glory in *Little Stinker*, winning the women's International Aerobatics Championship titles in 1949 and 1950. In 1988 she became the first woman inducted into the International Aerobatic Hall of Fame. "The finest times of my life," she says today.

In 1985 she gave *Little Stinker* to the Smithsonian. Restored to its heyday luster and unveiled to the public in October, the plane shares exhibition space with a 1975 monoplane belonging to the late aerobatic champion Leo Loudenslager.

Like its diminutive, 95-pound owner, *Little Stinker*'s appearance belies its gutsiness and power. The wingspan is not quite 17 feet, and the plane stands just inches above its 5-foot-2-inch pilot. Revolutionary for its small size and agility, the Pitts model would dominate aerobatic competition for decades.

By the 1920s, air shows were beguiling the public with aerobatic acts, but the theatrics attracted few female pilots. In fact, Skelton was the first woman to execute a show-stopping maneuver called the inverted ribbon cut. Flying upside down 12 feet off the ground, her propeller would slice a two-foot-wide foil strip strung between two poles. The first time Skelton attempted this stunt, the engine stalled while she was upside down just a few feet off the ground. Somehow she righted the plane, landed safely and went on to make the ribbon cut a highlight of her act.

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Skelton grew up playing with model airplanes and watching pilots do their stuff over the naval station near her parents' home in Pensacola, Florida. Bitten by the flying bug, she and her parents got pilot's licenses. Skelton soloed on her 16th birthday. Four years later, in 1946, she launched her aerobatics career: "I cut a deal to fly in air shows for $25 and gas."

Even so, she feels she got the better part of the bargain. "There's a feeling of freedom when you're off the ground," she says. "You look out at the wings and wonder what's holding you up." —*Paulette Dininny*

A Tribute to His Roots

INSCRIPTION ON MUSEUM WALL

"WE HADN'T TALKED IN 22 YEARS," says Duane Blue Spruce of the anxious moment he reunited with his Native American father in 1988. "I had memories of him from when I was very little, but he didn't know who I was, and I didn't know who he was." Blue Spruce, then 27, approached his father, his hand extended. But in seconds, his father's arms enveloped him, pulling him into a long-overdue embrace.

Finally reconnecting with his Laguna Pueblo father, Blue Spruce, an architect for the Smithsonian's National Museum of the American Indian, vowed he'd never let family and heritage slip away from him again. That's one reason the 40-year-old facilities planner and father of two joined nearly 7,000 patrons who have donated $150 each to have their names inscribed on a commemorative Honor Wall that will overlook the new museum's skylit rotunda.

Having his name etched on the museum he's helping build is a tribute to his Native American roots, Blue Spruce says. "It's documentation of a legacy that I can pass on to future generations of my family. In a hundred years, they might see my name on the wall and say, 'That's my great-great-grandfather.'"

A woven copper wall planned for the museum symbolizes the Native traditions of basketry and weaving, says Blue Spruce.

Blue Spruce's parents divorced just months after his birth in New York. Though his mother, who is of Spanish descent, made an effort to teach him and his sisters about their Laguna Pueblo ancestry, they soon lost touch with both their father and Native heritage. "I knew it was a part of me," he says, "but I was physically far removed from Pueblo culture."

After the reunion, Blue Spruce began filling in the family and cultural gaps, but the real awakening came when he moved to New Mexico in 1991, "to the land of my parents and grandparents. Walking in their footsteps helped me rediscover my roots," he says of his decision to leave a Manhattan architectural firm, his second job since graduating from Syracuse University in 1984.

His first trip to the ancient dwellings of Chaco Canyon in New Mexico still resonates. "They were constructed by Pueblo ancestors around 850 A.D. using architectural

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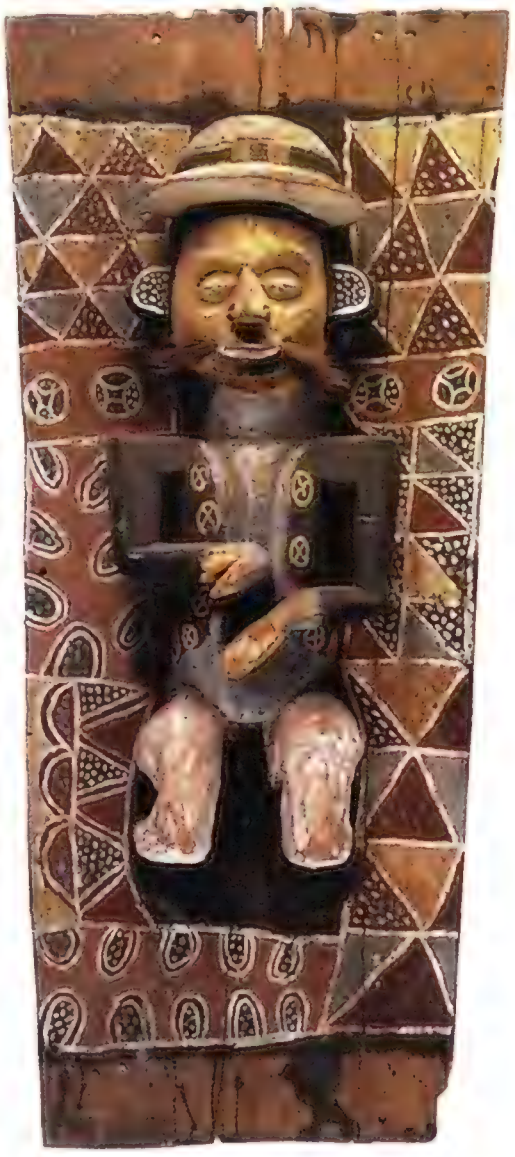

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and geometrical knowledge," he says. "I felt a strong sense of connection to the brilliant minds and spirit of cooperation it took to build that."

Accepting a position with the Institute of American Indian Arts in Santa Fe, Blue Spruce was able to marry his profession to his cultural background by helping design the institute's museum, sculpture garden and campus buildings. That work brought him to the attention of planners for the Smithsonian's Indian museum. Arriving in 1993 during the early phase of the project, Blue Spruce helped draw up plans for the $219 million building scheduled to open in 2004. Architects consulted with Native artists and tribal leaders early on for cultural input. Departing from the rectangles common to the Mall, they designed a spiraling five-story curvilinear structure of textured limestone.

"The feeling was that the building should appear as if it were a natural element," Blue Spruce says, "like a large rock shaped by wind and water over time. It's something that I'm extremely proud of." —*Kim Fernandez*

Not long after Juan Muñoz began his series of round-bottomed conversation sculptures in 1990, he grouped them in ensembles to create perplexing, dramatic tableaux.

The Mystery of Muñoz

SCULPTURES IN AN EERIE DRAMA

IN AUGUST, SPANISH SCULPTOR JUAN Muñoz died of an aneurysm, just weeks before the opening of a major survey of his works at Smithsonian's Hirshhorn Museum. He was only 48. Friends remember Muñoz as erudite, energetic and filled with a love for life. But his art reflects a world fraught with isolation, disorientation and more than a touch of the absurd. He once said his work was "about a man in a room waiting for nothing."

Best known for his enigmatic figures cast in bronze and resin, Muñoz's installations create intense drama. Among his intriguing cast of characters on view are several dwarves, an inscrutable clique of teetering orb-shaped men and, on a catwalk above the gallery, 50 figures in gray uniforms laughing conspiratorially. Muñoz built surreal sets for his troupe, using bleachers, patterned floors, balconies and handrails. In one room, wrought-iron balconies and commercial-style "H-O-T-E-L" signs remind us of a quiet European street. But in the same gallery, a bronze ventriloquist's dummy smiles inanely across a dazzling trompe l'oeil floor that seems to shift disconcertingly.

It's all quite mysterious, and like detectives, we try to piece together clues to figure out what Muñoz is saying. The stage is set, but crucial evidence is missing, as Muñoz only hints at possible narratives. A key piece features five ivory-colored male figures seated as though around a table. They lean forward edgily or recoil in mutual distrust, and one looks suspiciously into a huge mirror where we're reflected as part of their uncomfortable gathering. The gray figures on the balcony, though standing in various postures, have identical facial features. What are they laughing about? There's something menacing in their mirth. Are we the object of their fun? We don't know whether to laugh along or run for the door. Trying to make sense of the artist's uncanny setups, it gradually becomes clear that he's less interested in telling a particular story than in creating a sense of our own uncertainty.

Muñoz became an artist relatively late in life. Born in Madrid in 1953, he was tutored by a neighbor who happened to be an art critic. At 17, he left home and, for 12 years, traveled around Europe and the United States, enrolling in art schools in London and New York but spending more time studying and writing about art than making it. Finally, at age 30, Muñoz focused on sculpture.

The exhibition of his works will remain at the Hirshhorn through January 13 and then travel to Los Angeles, Chicago and Houston.

As Muñoz's reputation flourished on both sides of the Atlantic, the Hirshhorn acquired one of his sculptures—*Last Conversation Piece*—in 1996. The five-piece bronze, which is situated on the museum's front lawn, rarely fails to stop passersby. Three of its monkish figures stand in a cluster whispering, while the other two seem to be hurrying toward them to hear what is being said. It's Juan Muñoz's stage, and he challenges any playwright or actor fool enough to step onto it. —*Jason Edward Kaufman*

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BRAVE NEW

EVERYTHING YOU WANTED TO KNOW ABOUT STEM CELLS, CLONING AND GENETIC ENGINEERING BUT WERE AFRAID TO ASK

BY JAMES TREFIL

IT WAS NOT BY CHANCE that President Bush's first televised address, last August, was about stem cell research, coming as it did at the height of a summer swirling with heated debate over the issue ("one of the most profound of our time," according to the President). That and other recent debates have raised questions not only about changes in science and medicine but about such profound issues as the nature and value of human life, and whether humans have the moral right to tamper with genetic material, on the one hand, or the obligation to develop technologies that would alleviate the suffering of millions, on the other. Such questions are important, but only by understanding the science involved can we begin to address the ethical conundrums coming our way.

With nearly every advance in medicine, from the smallpox vaccine to organ transplants, there has been controversy over how much we should be altering nature. When Louise Brown, the world's first test-tube baby (now a healthy 23-year-old), was born in England in 1978, some people called conception outside the body immoral and tried to have the technique banned.

Back in the 1970s, science made advances in two areas that seemed, on the surface, unrelated—but which have veered ever closer to each other. One was a growing understanding of, and ability to manipulate, deoxyribonucleic acid (DNA), the molecule that provides our genetic code. The other involved the advent of in vitro fertilization (IVF), the technology responsible for Louise Brown and nearly a million babies since.

IVF is a process by which eggs are removed surgically from a woman's ovaries and fertilized with sperm in a laboratory. After undergoing a few cell divisions, several of the resulting embryos are inserted into a woman's uterus where, with luck, at least one will develop into a full-term fetus. In any one trial of IVF, as many as 10 to 20 eggs may be extracted and fertilized, and the majority of the resulting embryos are often frozen at an early stage of development, in case they will be needed for later attempts at implantation in the uterus.

Though IVF offered new hope to many who could not otherwise con-

The sequencing of the human genome (illuminated here in a digital display) is just one milestone as science enters a new era.

WORLD

ceive, it also opened up a slew of ethical questions, beginning with the status of those embryos that remain unused in the lab. Then there is the fact that the woman who donates the egg need not be the one who carries the embryo or who raises the child. It is, in fact, possible to have as many as five adults who could claim parenthood in an IVF scenario: the sperm donor, the egg donor, the woman who carries the fetus and a couple responsible for its upbringing.

Still, for all the potential issues it raises, IVF was in many ways just the beginning, a relatively simple manipulation of the natural order. The closer science has gotten to deciphering our genetic makeup, the more complicated the landscape has grown.

In laboratories around the world, scientists bank and analyze DNA from families with genetic diseases.

GENES AND DNA

BY THE MIDDLE OF THE 20TH CENTURY, scientists had begun to realize that "genes"—the name given to whatever it was that passed down inherited traits—were made of DNA and that they were located on chromosomes, threadlike structures found in cell nuclei of almost all living things.

For molecular biologists, the second half of the 20th century was devoted to divining the structure of the DNA molecule (the double helix, discovered in 1953) and then figuring out how the molecule's fundamental components—called nucleotides—combined to form genes, how genes provided the instructions for making the molecules that allow living things to function, which genes did what, and where they were located. Just last year, scientists announced that they'd sequenced the human genome. Though they are far from figuring out what all of our genes do, they now know the order and location on our chromosomes of all of the nucleotides and have identified about half of our genes.

Much of the research on human DNA has focused on diseases that are prevalent in families or in certain ethnic groups—starting with such single-gene disorders as cystic fibrosis, Tay-Sachs disease and sickle-cell anemia—because medical histories of affected families were available and the fruits of such research might save, or at least improve, countless lives.

As our understanding of our genes has increased, so have our choices dealing with birth and conception. For several decades, couples with family histories of particular diseases have sought the advice of genetic counselors about whether to have children. With amniocentesis—a procedure in which amniotic fluid is extracted from the womb and examined—expectant mothers have long been able to determine if a developing fetus has certain chromosomal disorders. But more recent advances have brought the potential for couples to be advised not only on the basis of family history but on the presence of genetic markers of hereditary disease in their DNA. And with IVF technology came the ability to screen embryos for chromosomal anomalies—and for specific genetic traits, including genetic diseases.

Along with advances in screening in recent decades, there has been a surge of research on ways to treat existing genetic disorders. That research was based largely on two great truths that had been revealed about DNA. The first is that the sole function of most genes is to give cells encoded instructions for churning out particular proteins, the building blocks of life. There are tens of thousands of different proteins in the human body—from collagen and hemoglobin to various hormones and enzymes—and each is encoded by a particular order of nucleotides in a gene. (Many diseases are caused by defective genes that don't produce their protein correctly—and treatments that introduce missing proteins have long been used for such disorders as diabetes and hemophilia.)

The second insight is that all living things use the same basic genetic code. Just as all the books in a great library can be written in a single language, so, too, are all living things the result of different messages "written" in the same exact DNA language—and "read" by our cells. This means that if a stretch of DNA is taken from a donor and inserted into the DNA of a host's cells, those cells will read the new message, regardless of its source.

Though there are endless possible applications for this phenomenon (and at least as many complicating factors), doctors found particularly promising the idea of fixing broken genes by manipulating DNA through a process known as gene therapy, a form of genetic engineering.

GENE THERAPY

IN SOME WAYS, MANIPULATING DNA is a completely natural phenomenon. Certain kinds of viruses—including HIV and others—infect us by inserting their genetic information into our cells, which then haplessly reproduce the invading virus. In some forms of gene therapy, this kind of virus itself is engineered so that the viral gene that causes the disease and allows the virus to reproduce is removed and

JEAN CLAUDE REVY/PHOTOTAKE; P. 39 GETTY IMAGES

replaced with a healthy version of the human gene that needs "fixing." Then this therapeutic, engineered virus is sent off to do its work on the patient's cells. There are hundreds of procedures using such "viral vectors" in clinical trials today, targeting diseases that range from rheumatoid arthritis to cancer. So far there have been few, if any, real successes—and the field received a serious setback in 1999 when a patient died while undergoing gene therapy trials for liver disease.

But even if this form of gene therapy, or one like it, can be made to be safe and effective, it still represents a relatively short-term approach to genetic disease—compared with what is theoretically possible. After all, even if individuals can be successfully treated, their descendants would likely still inherit the gene or genes that caused their ailments. The form of gene therapy we've been discussing affects so-called somatic cells, which make up the vast majority of cells in our body. But it is not somatic cells but germ cells—our eggs and sperm—that pass our genes to our offspring.

GENETIC ENGINEERING

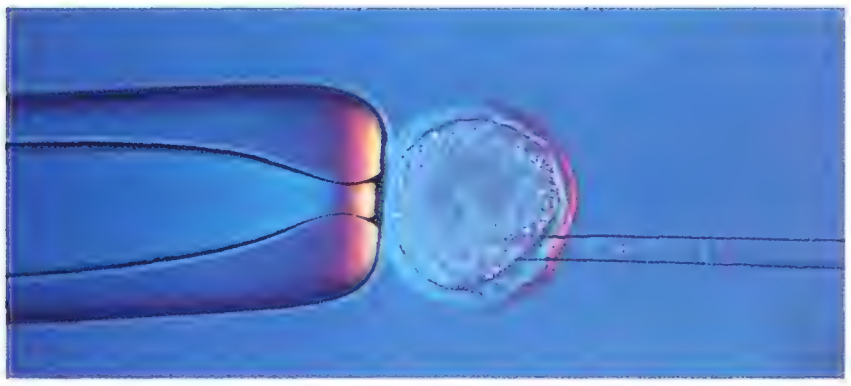
WHEN TALKING ABOUT CHANGING THE DNA in human germ cells, scientists use the term "germ line therapy." But in plants or animals, it's what we commonly think of as "genetic engineering." Either way, it means altering the DNA of an organism in a way that increases the likelihood (or, in some cases, ensures) that all of its offspring will have the same, engineered, characteristics.

So far, this form of genetic engineering has not been attempted on humans (as far as we know), but it is used on nearly every other life-form—from bacteria to plants to livestock. Virtually all insulin used to treat diabetes comes from bacteria whose DNA has been modified by the addition of the human gene for insulin, which the bacteria then produce. Plants are routinely engineered so that they will be resistant to certain pests or diseases, withstand particular herbicides or grow in previously unusable soils. One area of intense debate concerns the extent to which such genetically modified organisms should be used in

Once genes that cause diseases are identified (as at this DNA bank), individuals—even embryos—can be screened for them.

agriculture. In the United States, about half of the soybeans and a quarter of the corn grown on farms have been genetically modified. While the industry and many experts argue that products that are easier to grow or contain more nutrients (or even produce pharmaceuticals) could help prevent worldwide hunger and disease, critics question the possible side effects—particularly to the environment—of introducing new genes into agricultural products.

The truth is, there is still an inestimable amount that we don't know about the functions of particular genes or how they work in tandem. Much of the concern about genetic engineering—in plants or in people—rests on this fact. Yet with the promise of tomatoes that prevent cancer, salmon many times the size of those produced in nature, even pets engineered to be nonallergenic, many people hope that similar enhancements can be made to human genes as well. After all, such techniques as genetic screening of embryos, gene therapy and genetic engineering have the potential not only to prevent disease but to increase the likelihood of desired traits—from eye color to intelligence and other attributes. (Though we're very far from custom-designing our offspring, there are already cases of genetic screening of embryos for desired traits—including parents seeking bone-marrow matches for older, ill children.)



In animal cloning—which has often resulted in serious birth defects—the first step is emptying an egg of its genetic material.

After Dolly the sheep became the first mammal cloned from an adult, many others (like these first cloned pigs) followed.

CLONING

THERE ARE ALSO THOSE WHO SEE great promise in another form of custom-designed offspring: cloning. Though most scientists oppose human cloning, three researchers caused quite a stir earlier this year when they each, independently, announced that they were working to create human clones.

The modern age of cloning can be said to have begun in 1996, when Ian Wilmut of Roslin Institute in Scotland oversaw the birth of Dolly, the first mammal known to have been produced by cloning from an adult cell. Worldwide "Hello, Dolly" headlines announced the breakthrough, and subsequently, scientists working with goats, pigs, mice and cows followed in Wilmut's path.

To "create" Dolly, Wilmut and his colleagues took an unfertilized egg from a ewe and removed its chromosomal material, replacing it with a somatic cell (replete with DNA) from another ewe. In normal fertilization, when sperm and egg merge, the resulting cell—containing all the genetic information necessary—immediately starts dividing. In cloning Dolly, the somatic cell and the egg were fused with an electric current, which somehow prompted the package to act as though it were a newly fertilized egg. The resulting embryo was inserted into the uterus of a third ewe, using the techniques that had seen such success in in vitro fertilization.

In some respects, cloning can be likened to a construction project. The egg is like a crew of workers ready to build according to the specifications on a blueprint (DNA) once the plan is finalized and the whistle blows (fertilization). Whatever the crew sees on the blueprint, it will build. In the cloning process, scientists insert an already-completed blueprint and—in the form of an electric current or some other prompt—blow the whistle.

But just as independent builders using the same blueprint can build slightly different structures, so cloning does not create absolute replicas. Though a newborn clone will have chromosomal DNA identical to that of the adult donor and in that way would be the adult's genetic twin, it would also be a twin developed as a fetus in a different womb, flooded with a different bath of chemicals at different points in its development, born decades later and raised in a different environment. The clone could also differ from the donor due to trace DNA in the donor's egg—in structures called mitochondria, for instance—that could affect the clone's development. (In fact, there have been recent reports of human babies who have genetic material from three adults, due to a technique that uses healthy mitochondria from a donor's egg to enhance fertility.) So, though Dolly resembled her DNA donor, other sheep that Wilmut and his colleagues have cloned vary in appearance and

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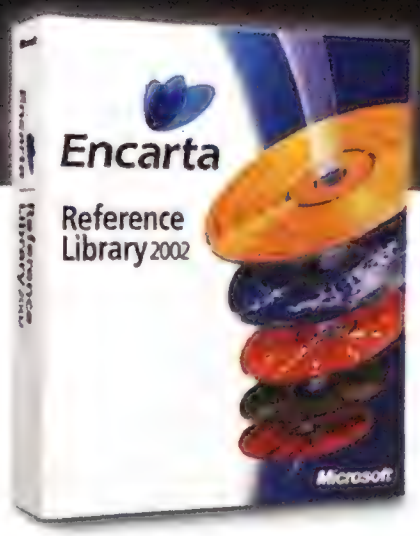

There are those who want to use only adult stem cells (above) in research rather than cells from embryos left over from IVF.

temperament from their DNA donors as well as from other clones developed from the same DNA.

It is also important to note that Dolly was born only after more than 200 other clones were spontaneously aborted or stillborn. Attempts to clone animals since have often resulted in severe birth defects—from dramatically increased birth size to enlarged organs to immune deficiencies. Going back to the blueprint analogy, Cornell professor and cloning expert Jonathan Hill adds, "It seems the cloned DNA is not only a 'used' blueprint but one that may have certain pages stuck together, making some of the details particularly hard to read."

As a result of these and other factors, many scientists—and politicians—believe there should be a ban on human cloning. Others are wary that such a ban might be too restrictive, since some techniques used in cloning are also used in other promising areas of science—including applications of IVF technology and stem cell research.

STEM CELL RESEARCH

CLONING AND STEM CELL RESEARCH ARE connected in at least one important way. Every one of the trillions of cells in our bodies (including our eggs and sperm, which have but one set instead of two) contain the same DNA. The cells in your skin, for example, contain the same gene for producing insulin as those in certain regions of your pancreas, but only the latter actually make the protein. Most of the genes in our cells are inactive, leaving only the relevant ones to do their work. Though we know little about how this occurs, we do know that there is a period early in development when the cells have yet to begin the processes of determination and differentiation into blood, muscle or any other kind of cell, and all cells can still develop into any cell in the adult. In humans, this property—called pluripotency—is lost by the end of the second week after fertilization.

Part of what made Wilmut's success with Dolly so extraordinary was that he seems to have been able to revert an adult sheep cell back to its pluripotent state (though with all of the unexplained complications we've already detailed). Other techniques are being pursued for isolating adult stem cells—cells that are only partially differentiated—and reverting them to a pluripotent state, or nudging them to develop in particular directions. In the meantime, there is another source of pluripotent cells: the embryo itself. Pluripotent cells from human embryos are the embryonic stem cells at the center of last summer's debate.

Much of that continuing debate centers on the fact that human embryonic stem cells are obtained, almost exclusively, from embryos left over from IVF. Though proponents of research on them point out that they would be destroyed anyway, many opponents believe that these embryos, though composed of just a few dozen cells, are human lives, and so should be saved.

The other reason that stem cells have burst into the news has to do with their exceptional promise. Scientists have learned to culture human embryonic stem cells and allow them to divide and multiply, while preventing them from switching on or off any of their genes. By exposing these stem cells to different molecular compounds, they are trying to understand how that switching process works so that they can direct this cell to become a neuron, say, or that one to become a blood cell. (These two examples, in fact, are feats at which they have already had some measure of success.)

Eventually, some believe, we may be able to control the development of these pluripotent cells so that we can replace tissues damaged by disease or accident. Nerve cells damaged by Parkinson's or spinal cord injury, for example, or heart tissue of cardiac patients, might ultimately be replaced by tissue grown from stem cells.

Some scientists see even the potential to create custom-made tissue by using stem cells that are exact matches to a particular person, thus obviating the greatest problem in transplant surgery—rejection of the implant by the host's immune system. "Therapeutic cloning," as this procedure has been called, would involve inserting a patient's own DNA into an egg and then prompting the cell and egg to fuse and start dividing, as was done in creating Dolly. Each cell in the resulting embryo, and thus its stem cells, would have exactly the same DNA as the patient, and tissues derived from these cells would match exactly the patient's own tissues.

Along the wide spectrum of debate, there are those for whom embryonic stem cell research is acceptable as long as embryos are used with the consent of the egg and/or sperm donors (or, in the case of therapeutic cloning, the sole DNA donor); there are those who believe it is acceptable as long as it is done

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Louise Brown (with her parents, Lesley and John) was the world's first IVF birth, following more than 80 failed IVF attempts.

with embryos that would be destroyed anyway; and there are those for whom destroying even these "extra" embryos is abhorrent, and creating embryos for research or therapy all the more so.

President Bush, in his August address, announced that the federal government would fund research with human embryonic stem cells but only that which uses those "lines" (cells developed from the original stem cells of a single embryo) already in existence. The scientific community has argued (and the administration has conceded) that there are fewer lines developed for research than the "more than 60" the President mentioned in his speech. Those that do exist, they say, may be inappropriate for use in human therapies, because they have been cultivated in mouse-cell cultures and represent a very limited gene pool. Other critics of the President's position point out that—as in many areas of research—curbing public funding does not mean that the research won't go on, just that it will go on, unregulated, under private sponsorship. Still others feel that the President was wrong to let any such research continue, let alone with public funding. Clearly, the debate isn't ending any time soon.

We are often reminded that just because we can do something—such as exploit the latest technology—does not mean that we should. Ian Wilmut—a vocal opponent of human cloning despite (or perhaps because of) his work with animals—offers a complementary observation: "What is 'natural,'" he points out, "is not necessarily right, and what is 'unnatural' is not necessarily wrong."

It is always risky navigating uncharted territory. President Bush stated it adroitly, in August, when he said: "As we go forward, I hope we will always be guided by . . . both our capabilities and our conscience."

James Trefil, a professor of physics at George Mason University, is a frequent contributor.

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strange BEDFELLOWS

A NEW EXHIBITION TRACKS THE TURBULENT NINE WEEKS THAT ARTISTS VINCENT VAN GOGH AND PAUL GAUGUIN LIVED AND PAINTED TOGETHER IN THE SOUTH OF FRANCE

◆ BY JOSEPH HARRISS

"MY DEAR GAUGUIN," SAID A CONTRITE, SOBER VINCENT van Gogh, "I have a vague memory that I offended you last evening." The offense having been nothing more than a glassful of absinthe thrown at his head, Paul Gauguin readily forgave his high-strung friend. But his doubts about their two-month experiment in communal living in the Provençal town of Arles were confirmed the next night, when van Gogh, distraught over Gauguin's impending departure, ran after him in the street hurling wild accusations. Gauguin turned to confront him, whereupon van Gogh returned to the house they shared. There he used a razor to cut off part of his left ear, which he carefully wrapped and presented to a young woman at the local brothel. Van Gogh was hospitalized, and Gauguin left for Paris the next day. But after van Gogh's discharge from the hospital, he begged Gauguin in a letter not to speak ill of "our poor little yellow house." Some dreams die hard.

The creative sparks that flew when these two opinionated avant-garde artists came together in the South of France is

The vastly different artists (in self-portraits they exchanged in early October 1888—Gauguin's is at left) engaged in an intense creative dialogue in the little Yellow House (with green door, on a corner, in van Gogh's rendering) they shared in Arles.

les miserables

one of the most dramatic episodes in the history of art. The tense friendship and unspoken rivalry between van Gogh and Gauguin in late 1888 in Arles produced works that helped set the stage for much of what we know today as modern art. It has also so inspired writers and filmmakers that most of the Western world knows what happened to van Gogh's ear. But while both of these painters have been studied exhaustively over the past 100 years, their interaction and mutual influence have never been addressed in a major exhibition.

This fall, the Art Institute of Chicago and Amsterdam's Van Gogh Museum joined forces to fill that gap with a stunning, comprehensive show entitled "Van Gogh and Gauguin: The Studio of the South." (The exhibition will be on view at the Art Institute through January 13, 2002; in February it travels to the Van Gogh Museum.) Six years in the making, and with financial support from the Federal Council on the Humanities and the Ameritech Foundation, the show brings together 135 major works drawn from the two museums' own collections and from more than 60 public and private collections around the world. New findings from the archives and technical research using microscopic study, x-radiography, thread counts, and fiber- and paint-sample analysis have allowed curators to piece together an almost day-to-day picture of the pair's collaboration.

"We have many of the great pictures upon which these two artists' reputations rest," says the Art Institute's Douglas W. Druick, cocurator of the show, including "paintings such as several of van Gogh's *Sunflowers*, *The Yellow House*, two versions of *Starry Night*, along with Gauguin's *Human Miseries* and *Vision of the Sermon*." Some of these have not been seen together since they were painted in 1888. Also on view are several that the two worked on simultaneously, each in his own evolving style. "It's exciting," says Louis van Tilborgh, curator of paintings and

Sunflowers held significance for both Gauguin (left at 40, just before coming to Arles) and van Gogh (years earlier at 18). Van Gogh painted his (top right) in 1888; Gauguin's were done 13 years later in Tahiti.

sculpture at the Van Gogh Museum, "because this gives us a chance to see these two treating the same subjects at virtually the same time."

When van Gogh met the 39-year-old Gauguin at a Paris art gallery in November 1887, the Dutch painter was at a pivotal point in his life. Then 34, he had finally emerged from many years of false starts and failures, having worked for an art dealer in London and Paris before turning to teaching and lay preaching, then moving on to theology studies and missionary work. He was 27 before he discovered his vocation as an artist. When he first joined his brother Theo, an art dealer in Paris, in March of 1886, he was still painting in the dark, heavy style of his early masterwork *The Potato Eaters*. But he soon began experimenting with colorful pointillist brushwork and light-filled Impressionism.

Though Gauguin, too, came late to art (he was 25 when he started painting), he had been doing Impressionist canvases since the late 1870s and had worked with such masters as Camille Pissarro. That experience, plus his adventuresome, knockabout background as a sailor who had cruised the world, a stockbroker who had left his wife and children to devote himself to painting, and a wanderer who had lived on the Caribbean island of Martinique, greatly impressed the unworldly van Gogh. Despite their differences, the two quickly found they had much in common, as both were seeking new forms of artistic expression and both had great regard for each other's work. Van Gogh praised the "high poetry" of Gauguin's painting, while Gauguin admired van Gogh's passionate approach to art and, with cool calculation, saw that the Dutch artist's brother could be useful in promoting and selling his work.

In a gesture of mutual respect, the two exchanged paintings in late 1887: van Gogh gave Gauguin two studies of

Gauguin's first work after joining van Gogh, *Farmhouse in Arles*, reflects the younger man's influence in subject but not in style.

PRIVATE COLLECTION (2); AVEN; VAN GOGH MUSEUM, AMSTERDAM/VINCENT VAN GOGH FOUNDATION; P. 51 TOP LEFT AND BOTTOM: VAN GOGH MUSEUM; FOGG ART MUSEUM, HARVARD UNIVERSITY ART MUSEUMS

"Art is an abstraction," wrote Gauguin, whose portrait of café owner Marie Ginoux is more stylized and studied than van Gogh's (opposite).

cut sunflowers, while Gauguin reciprocated with a canvas done in Martinique of a woman, boy and cow on the bank of a dried-up river. Gauguin then left for Pont Aven, in Brittany, where there was an artists' colony. Van Gogh, in turn, was drawn by the clarity of the light of southern France, wishing to see nature under a brighter sky, because, he wrote to Theo, "one feels that the colors of the prism are veiled in the mist of the North." On February 20, 1888, he arrived by train in Arles.

He was a man reborn. Responding to the brilliance and warmth of Provence, he threw himself into one of the most productive periods of his life, painting landscapes, flowering trees, haystacks, virtually anything that caught his eye. "I have a terrible lucidity at moments, when nature is so glorious that I am hardly conscious of myself and the picture comes to me as in a dream," he wrote Theo. Already he was leaving behind the delicate, evanescent Impressionist approach he had picked up in Paris, and starting to use strong, pure color to express himself more forcefully.

But yearning for the companionship that his difficult, stubborn character had long prevented him from finding with others, he envisaged a brotherhood of like-minded painters living and working together. Now, he felt, was the time to realize it. In May, with Theo's financial help, he rented a small house on Arles' place Lamartine, near the train station. The color of fresh butter, it had two rooms on the ground floor and two above, with lavatory privileges at the hotel behind it. He furnished the house sparely with two beds, a dozen rush-bottomed chairs and a few other necessities. The Yellow House, as he called it, would do nicely for his planned Studio of the South. At its head, in his idealized view, would be his much-admired new friend, Paul Gauguin, and he bombarded Theo and Gauguin with letters urging Theo to subsidize the painter's role in the enterprise in return for paintings. On June 5, two days before Gauguin's 40th birthday, a formal invitation was extended to the near-penniless artist; 50 francs were enclosed. Although still hesitant, Gauguin accepted in late June, but kept putting off his departure.

Meanwhile, van Gogh worked feverishly to produce a

STATE PUSHKIN MUSEUM OF FINE ARTS, MOSCOW; P. 53 INDIANAPOLIS MUSEUM OF ART

"Between two such beings as he and I," Gauguin reflected, "a sort of struggle was brewing."

series of paintings—they would become his signature sunflowers—for the house. In early October, at van Gogh's request, the two exchanged self-portraits. Van Gogh's was a starkly austere work, the gauntness of his face emphasized by almost shaven hair and intense eyes vaguely staring into the distance—the characteristics, he explained in a letter, of a Buddhist monk. Gauguin sent van Gogh a written description of his own portrait ahead of the work itself. It was, he said with typical swagger, "the face of an outlaw, ill-clad and powerful like Jean Valjean—with an inner nobility and gentleness . . . . The eyes suggest the volcanic flames that animate the soul of the artist." But when van Gogh looked at the painting, he saw an overriding pessimism and desperation. "What Gauguin's portrait tells me above all is that he cannot go on like this," he concluded.

Finally, in mid-August, Gauguin made plans to leave for Arles. With Theo underwriting his living expenses and paying for the train ticket, it seemed a sweet, no-risk deal. As he wrote to his estranged wife, he simply planned to spend "six months with a painter who will provide me with food and lodging in exchange for drawings."

Now that his friend's arrival was imminent, van Gogh worked himself practically to exhaustion, often painting nonstop from dawn to dusk to have as much as possible to show him. Although casting himself in his own mind as something of a disciple of Gauguin's, van Gogh also wanted to assert his independence before being subjected to the older man's influence. "I am sufficiently proud to want to impress Gauguin to some extent with my work," he wrote Theo. The resulting series of paintings includes *The Yellow House*, *The Bedroom* and *The Poet's Garden*.

The work took its toll, and van Gogh was overwrought when Gauguin arrived on October 23. Still, the pair began sorting out living arrangements. Gauguin bought a chest of drawers and various household utensils, but confronted with his partner's untidy living habits, the old bohemian began to act positively bourgeois. "Everywhere and in everything I found a disorder that shocked me," he later related. "His paint box could hardly contain all those tubes, crowded together and never closed." And money! "From the very first month, I saw that our common finances were taking on the same appearance of disorder. . . . I was obliged to speak, at the risk of wounding that very great touchiness of his."

Gauguin set up a strict budget, with fixed sums for rent, food, incidentals and tobacco. A certain amount was also set aside for "hygienic," as they termed them, brothel visits, which, the two reasoned, would promote productivity by discouraging entangling amorous relationships. All the while, Gauguin was regaling van Gogh with tales of his adventurous life, presenting a macho persona that only increased van Gogh's hero-worship. "This gives me an enormous respect for him," he wrote Theo. For his part, Gauguin later claimed he had had a premonition of trouble. "Between two such beings as he and I," he reflected, "the one a perfect volcano, the other boiling too, inwardly, a sort of struggle was brewing."

Gauguin liked to settle into a new place before painting, but the day after his arrival, the eager van Gogh pushed him out of the Yellow House to do landscapes. Technical research reveals that they both painted, that first workday, on the same kind of pre-primed linen canvas that van Gogh was using at the time; apparently van Gogh was so impatient that he gave canvases to his friend rather than wait for him to buy and prepare his own. In any case, van Gogh's *Old Yew Tree* is done with his usual impetuous, pell-mell brush strokes. Gauguin, however, took an almost Cézannesque approach, carefully executing his *Farmhouse in Arles* with studied composition and deft, discreet strokes.

The pair tried an experiment, buying 20 yards of coarse jute cloth to use instead of canvas. The hairy, absorbent fab-

MUSEE D'ORSAY, PARIS

Done at the same time, van Gogh's portrait of Madame Ginoux (finished in just one hour) is more spontaneous than Gauguin's.

"Gauguin gives me the courage to imagine things," said van Gogh, whose *The Sower* reveals the influence of his friend's visionary approach.

ric, similar to burlap, forced Gauguin to try a rougher application and abandon his usual technique of building up thin layers of color. As for van Gogh, his gestural strokes and characteristic impasto, difficult to achieve on the jute, became subordinate to his use of color. Another landscape foray took the duo to Arles' Alyscamps area. Gauguin's deliberate technique captured a more decorative, imaginative view of the locale. Van Gogh's paintings, rendered in a quick, agitated style, were based more on the actual scene. In a new departure for van Gogh, however, he showed a willingness to adapt to Gauguin's habit of doing studies outdoors and the finished work in the studio—an important concession, since van Gogh had consistently maintained his need to work from direct observation of his subject.

Gauguin, too, reflected his partner's influence, appropriating van Gogh's concern for human suffering in his somber, melancholy study of grape pickers, *Human Miseries*. He also began troweling paint on thickly with a palette knife in a style resembling van Gogh's. But the stylistic influence in both cases was temporary. "Their ideas on art differed greatly," says Andreas Blühm, head of exhibits at the Van Gogh Museum. "They influenced each other to a degree, and then went back to their original styles." The Art Institute's Douglas Druick agrees. "The influence on each other was formative and motivational rather than in technique as such," he says. "For example, Gauguin picked up the idea of the painter as pilgrim and missionary from van Gogh."

Their differences in approach and style are immediately evident in their respective portraits of Madame Ginoux, owner of the Café de la Gare near the Yellow House. Van Gogh dashed off his version (p. 55) in the single hour she sat for them in early November. Gauguin, on the other hand, began with a chalk and charcoal study on paper, then, over the following days, transposed the portrait to the foreground of a bar scene he titled *Night Café* (p. 54), with Madame Ginoux giving the viewer a sly look as she proffers a glass of absinthe. Although the two artists worked side by side at the same time with the same model, the results could hardly have been more distinct.

VAN GOGH MUSEUM

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Van Gogh's portrait of Gauguin (left) and Gauguin's image of van Gogh painting sunflowers both mirror the deteriorating relationship between the two artists.

Van Gogh's view of the personality differences between himself and Gauguin was clearly rendered in the paintings he did of his and his friend's chairs in the little Yellow House. He chose to depict his own sturdy, rush-bottomed chair standing on a simple red-tile floor, with a pipe and tobacco lying on its seat. He pictured Gauguin's much more elaborate armchair, however, atop an exotic carpet, with a lighted candle and two books on its seat. As the show's detailed and scholarly catalog notes, the paintings "can be seen as displaced portraits, iconographic opposites."

When not painting, the two artists talked. Besides art, they discussed novels, history, the Bible, physiognomy. "Our arguments are terribly electric," Vincent told Theo. Van Gogh insisted that painting be from nature and that it offer a poetic dimension, while Gauguin called for art to have intellectual strength based on what took place in his "wild imagination." Ultimately, Gauguin ascribed van Gogh's views to "a disordered brain" and "absence of reasoned logic." Writing to his friend and fellow painter Emile Bernard, who van Gogh had hoped would join them in Arles, Gauguin said that, "In general, Vincent and I do not see eye to eye, especially as regards painting . . . . He is a romantic and I am rather inclined to a primitive state."

By mid-November, Theo had started selling some of Gauguin's paintings in Paris, giving the artist more money than he had seen in years. He thus began thinking of leaving Arles for Martinique, where he would start a Studio of the Tropics. Van Gogh's anxiety grew as he realized that his dream of a community of painters working in Arles was not to be. The tension between the two artists can be sensed in the odd portraits they did of each other in early December. Van Gogh painted Gauguin from the strange perspective of right-rear, in an awkward, roughly finished work, *Man in a Red Beret* (above, left), that suggests van Gogh was watching his friend cautiously. Gauguin produced a similarly disturbing image of van Gogh in *The Painter of Sunflowers* (above, right), in which van Gogh's head is distorted, the eyes lost in a trancelike gaze. Gauguin's depiction, the show's organizers write, is "loaded with defensive and aggressive implications."

Shortly after van Gogh's bizarre behavior of December 23, Gauguin boarded the night train for Paris. They never met again. In the asylum in nearby Saint-Rémy, which he entered voluntarily in April 1889, van Gogh went on to produce such brilliant works as *The Reaper*, *Cypresses* and his famed *Starry Night*. In May 1890, he left Saint-Rémy for the town of Auvers-sur-Oise, near Paris, to consult physician Paul Gachet, an amateur artist and collector who bore a marked physical resemblance to van Gogh and apparently suffered from a similar nervous disorder. Although van Gogh wrote to his brother that "I feel—a failure," he produced dozens of paintings and drawings during his two months in Auvers, including his renowned portrait of Doctor Gachet. (The work brought $82.5 million in 1990, making it the most expensive painting ever sold at auction.)

Despondent over his sense of failure and the debilitating effects of what was likely epilepsy and, perhaps, manic-depression, on July 27, 1890, van Gogh shot himself in the stomach. (About the gun, nothing is known. "It's one of the great mysteries in art history," says Andreas Blühm.) He died two days later, with Theo at his side. He was 37. Of his entire production of some 870 paintings (and 1,050 drawings), van Gogh sold just one—*The Red Vineyard* (now at Moscow's Pushkin Museum)—during his lifetime.

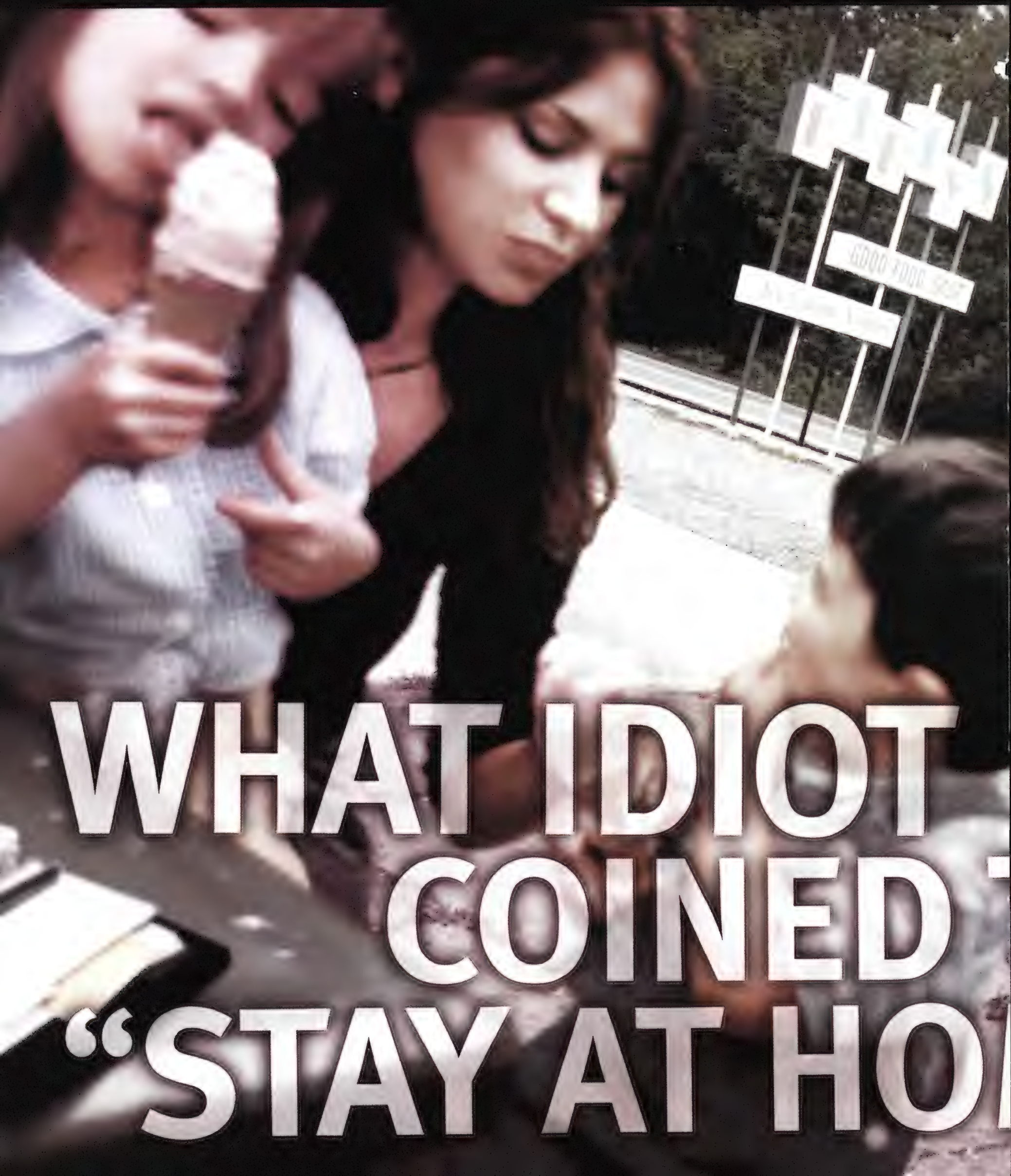
Paul Gauguin went on to paint for another 13 years in Brittany and the South Pacific. Wary that van Gogh's reputation was growing faster than his own, he often used the word *fou* (crazy) to describe him, and claimed not to remember how long they had spent together. "When I arrived at Arles, Vincent was trying to find himself," he wrote in 1903. "I undertook the task of enlightening him. . . . From that day on, my van Gogh made astonishing progress." In what the exhibition organizers call a "grotesque distortion," Gauguin went so far as to alter the chronology of the sunflower paintings to date them after his arrival. Still, Gauguin's memories of Arles stayed with him, rather poignantly. In Tahiti, ill and broke in 1898 at age 50, he asked a friend in Paris to send him sunflower seeds to plant in his garden. He did a series of still lifes featuring them, including *Sunflowers and Mangoes* (p. 52)—a fitting homage to his friend and their time together in the Studio of the South.

A regular contributor to these pages, Joseph Harriss has written most recently on Italian composer Giuseppe Verdi.

"A cypress with a star . . . a last attempt," van Gogh wrote to Gauguin in June 1890. The two figures represent the artists themselves.

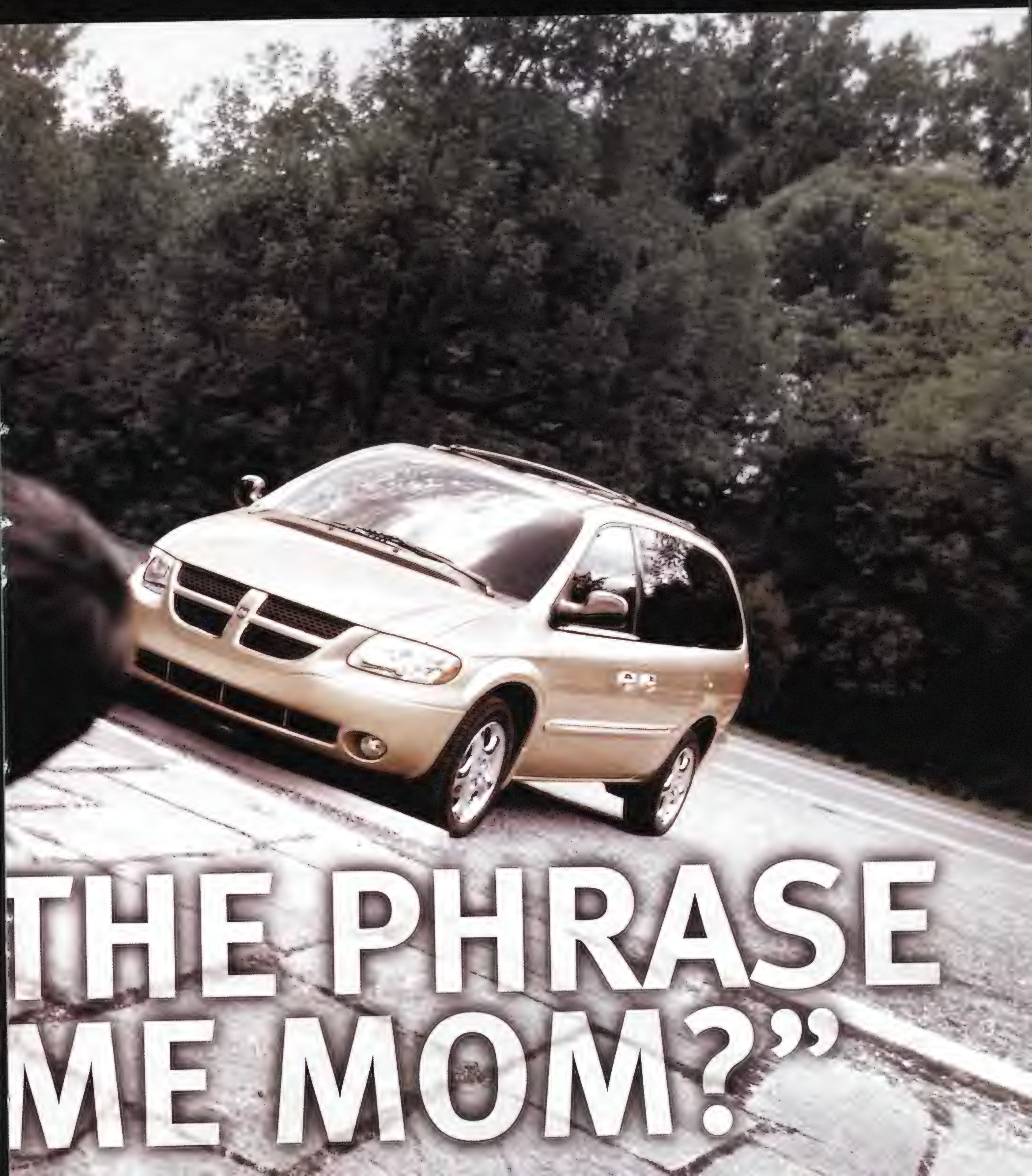
VAN GOGH MUSEUM (2); P. 59 KROLLER-MULLER MUSEUM, NETHERLANDS

DODGE CARAVAN. Come on. It's more like "pedal to the metal, go-go-go, remember to breathe Mom." And she drives a Caravan—the only minivan to offer dual power sliding doors and a power rear hatch. So, Mr. Catchphrase, take your little label and stick it—somewhere else. For more info, please call 800-4ADODGE or visit www.4adodge.com



GRAB LIFE BY THE HORNS

DODGE



THE PHRASE ME MOM?”

Smithsonian
journeys

cold comfort

INTREPID TRAVELERS PAY COLD HARD CASH TO CHILL OUT IN THE WORLD'S COOLEST HOTEL ◆ BY RUDY CHELMINSKI

PHOTOGRAPHS BY MICHAEL FREEMAN

Hire this man: entrepreneur Yngve Bergqvist turned a stretch of riverside tundra into one of Sweden's premier tourist destinations by convincing 8,600 people to pay up to $280 each to sleep in a large icebox.

No photographer's trick here: the colors in the Icehotel lobby change dramatically during a late winter day, moving from a pale light green in the morning to a rich sea blue during the early afternoon. Reputed to be the purest and most translucent in Europe, the ice from the Torne River is exported to Africa and around the world.

NOT SINCE I WAS A LITTLE KID IN A SNOWSUIT HAD I BEEN SO BUNDLED UP. MY feet were swimming in huge double boots; my body was encased in an insulated, full-length survival suit; the flaps of a fat, fur-lined hat were already down over my forehead and ears. All this just for a short walk. I was in the little Swedish town of Jukkasjärvi, and at 1 P.M. the sun had already set after the briefest of peeks over the horizon. The thermometer was hovering around -20 degrees Fahrenheit, my breath billowed white, and the snow echoed my footfalls with satisfyingly squeaky crunches every step of the way. My journey was only 100 yards between buildings; I'm sure I could have made it with a less spectacular cocoon of clothing, but the management is rather picky about keeping guests toasty at this particular holiday resort, so they suit you up good and proper. I was preparing for my first night at Icehotel, Jukkasjärvi's singular tourist attraction. Unlikely as it seems, the name suggests exactly what it is: a hotel made of ice. Unheated. One hundred and twenty-five miles north of the Arctic Circle.

The reception hall and a row of wooden cabins nestled amid frosted evergreen were typically Scandinavian: bright and light, a friendly birch fire in a stove, a host of cheery faces and the inevitable gift shop. But down a slope toward the river, the rustic familiarity changed abruptly to an otherworldly group of low-lying white hummocks that might have been constructed by some species of giant moles in the frozen northern earth. In the hummock nearest me, I noticed an ordinary door, set in an arched facade of pure, blue, gleaming ice. In and out of the door clomped guests and staff, begloved, suited and booted, most of them swaddled like me in the black survival suit with the Jukkasjärvi snowflake logo on the back. Without exception, the staff wore merry smiles—Isn't this great?—and the guests, for the most part, responded bravely in kind. "We've got over 60 rooms and suites," says Mark

A carved ice fireplace set into a bedroom wall and featuring a garishly-red ice fire is an ice sculptor's joke.

Armstrong, a 28-year-old Englishman with a degree in architecture from Oxford, who showed me around this frigid domain. Now in his third year as a full-time Icehotel employee, Armstrong is one of only a handful of experts in the understandably limited field of meltable architecture. Following Armstrong through labyrinthine passageways, I dope out the layout of the hotel, which is entirely dictated by the dynamics of snow and ice architecture. Earlier ice palaces, built of rectangular ice blocks and soaring impressively high—in effect, a series of great, straight roofless walls—were designed to be contemplated from outside.

Icehotel, by contrast, is all insides: low-slung, snug and fully enclosed. Wherever we walk, I see nothing but load-bearing arches with nary a straight wall in sight. The central unit is a wide passage supported by ranks of ice pillars, from which, at right angles, run smaller arched passages. In the snow walls of these side passageways, right and left, door-size openings are cut, giving entrance to individual rooms and suites.

The rooms are lit by candles in niches and cleverly concealed 10-watt halogen lamps (Armstrong and his associates perpetually battle to fine-tune the equation of light versus heat in the direction of the former). The hotel literally glows. Ice diffuses light beautifully, and miles of wires and fiber-optic cables hidden in the walls support a deliberately cool, indirect luminescence in blue-green tones. "We're allergic to too many colors," says art director Arne Bergh, who joined the Icehotel early on to design and develop an ongoing program of ice sculpture. Bergh insists that the hotel remain as free as possible of flash and gadgetry. "Warm colors on ice don't work—it looks like candy." Or a joke. Sure enough, a carved ice fireplace set into a bedroom wall, complete with a garishly-red ice fire, represents an ice sculptor's guffaw, like the various ice tables, chairs, chandeliers and other miscellaneous furniture around the Icehotel carved by a revolving group of Bergh's many international sculptor friends. The ice polar bear is impressive, and the ice grand piano a real tour de force, but the best laugh is an ice-tiled bathroom with an ice man lying in an ice bathtub, the ice-water level up to his chest and an ice toilet bearing the sign, "Out of order due to frozen pipes."

Icehotel is the brainchild of a strapping, jocular Swede of 52 named Yngve Bergqvist, a reformed engineer who, in the fastidiously delicate jargon fashionable these days, calls himself a "cultural entrepreneur." Bergqvist first came to Jukkasjärvi in the early 1970s to do environmental assessments for the giant iron ore

Icehotel desk clerks recommend that overnight visitors do a few push-ups before climbing into bed (a block of ice covered with reindeer hides and a sleeping bag). After a night in the cold, most lodgers opt for a warm repast in the nearby Wärdshus restaurant, but the hardy can always breakfast on the ice.

Bellying up to the bar becomes a whole new experience at Icehotel's Absolut Ice Bar, where no beer is served, because it freezes in the 20 degree F temperatures. Bartenders offer vodka "in the rocks" by pouring shots into glasses carved from ice. Mixers are kept in refrigerators to keep them warm. Each year, student artists come from Japan, America and Europe to learn how to create elaborate ice sculptures (opposite).

mine ten miles away in the town of Kiruna. Spread along the banks of the clear, chilly Torne River, Jukkasjärvi—from a Sami word signifying meeting place—was then a sleepy town of 500 or 600 souls, most of them past or present mine employees. The Sami had been driving their reindeer herds through the area since time immemorial, paying not the least attention to such geopolitical niceties as the borders of Finland, Sweden and Norway. Bergqvist quit the mine in 1979, bought an old, abandoned retirement home and set himself up in the hotel and restaurant business, attracting clients who wanted to fish, hike and white-water raft.

But when Jukkasjärvi froze up tight, as it did every winter, Bergqvist found himself with an empty hotel. A friend came up with the idea of building a big igloo as an offbeat venue for an art exhibition. With little else to occupy his time, Bergqvist started shoveling snow. Deviating from the classical Inuit igloo-building technique of cutting blocks of snow packed hard by Arctic winds, Bergqvist erected a plywood frame, shoveled masses of snow over it and sprayed it with water. The method worked. After waiting a couple of days for the snow to set, he knocked down the frame and found himself with a splendid 645-square-foot igloo, its structural integrity guaranteed by its geodesic egglike shape. The 1989 art show proved a great success; a lightbulb lit up over Bergqvist's head.

He hired extra shovelers, built a 2,690-square-foot igloo and immediately tried it out as a dwelling. Hauling in mattresses, reindeer hides and sleeping bags, he and a few friends spent several nights inside. However bitterly cold it was outside, the temperature in the wind-sheltered interior soon rose to 20 degrees F or so—not quite tropical, but perfectly bearable for the bundled up. Word got around. Bergqvist started taking in paying guests. Before long, he had jettisoned the idea of a single egg-shaped shelter in favor of a continuous, tunnellike arched construction, and by 1993 he was using removable steel molds and heavy equipment, such as snowblowers and throwers mounted on tractors.

No longer a glorified igloo, this was a true building of snow and ice. Now it had a registered name—Icehotel—and it measured 6,456 square feet. Mark Armstrong led me around the hotel's perimeter to the spot where he was preparing seven new rooms. We stood in front of what looked like a tall, thin Quonset hut. Steel forms ran alongside this structure, acting like a giant mold for the walls of the hotel's new wing. "At the start of the season, just when it's about -5 degrees Celsius [about 20 degrees F]," says Armstrong, "we pump water from the river into a snow cannon and make about 50,000 tons of snow. Then, with snowblowers and throwers, we pile snow into the forms.

"The crystals of this artificial snow," he continued, "are much finer than natural snow, and when it sets after a day or so, it is very dense and compact. The forms are mounted on skis, so we just tow them away, leaving a very strong, freestand-

The hotel hosts three to four major photo shoots each year with international models (American Evan Burns poses for the Italian fashion magazine D). Icehotel's publicist, Helena Sjöholm, says she rejects requests for location shots when the product conflicts with the hotel's image.

ing structure—a catenary arch, the same kind [Catalan architect Antoni] Gaudi used."

While the chapel columns before me were stout enough to support dozens of tons, they held nothing weightier than a roof of packed snow. At floor level, snow benches covered with reindeer hides stood on either side of a central aisle, while up front, an ice altar lay backlit under an elegant ice cross. The effect of intimacy and purity was palpable. It was easy to understand why marriages and symbolic remarriages in the ice chapel are extremely popular here. (A Lutheran pastor from nearby Kiruna reconsecrates the chapel each winter.)

At the far end of the central passageway, Armstrong led me into his masterpiece, a 46-foot-high snow dome over a circular room where a bartender in a parka was serving bright-red, overpriced vodka cocktails in glasses of pure ice. "The dome we designed was so big and so high we reinforced it with steel for safety," Armstrong explained, craning his neck upward at the oddly mottled ceiling. "We had to cover up the steel, but blown snow wouldn't stick, so we put people on a hydraulic lift and did it all by hand, snowball by snowball. I guess we've got 50,000 snowballs up there now."

But if the dome is Armstrong's pride and joy, it is the long ice bar beneath it that makes Bergqvist beam, recalling as it does the promotional triumph that explains much of his present prosperity. In 1993 he got the inspired idea of taking several photographs of a bottle of Absolut vodka on the smaller ice bar he had at the time. When I asked him about the episode, Bergqvist's face cracked into a grin beneath the fur ear flaps of his *chapka* that he seems to wear at all times, indoors and out.

"The vodka people didn't believe in it at the start," he said between business calls on the mobile phone that he carries everywhere. "I sent them the photos, and I heard nothing back. I called them and left messages, and they never returned my calls. I invited them here, and they never came. So I made several copies of the pictures, wrote a press release and sent it to a bunch of

SCOTT S. WARREN

Supermodels Naomi Campbell and Kate Moss posed in next to nothing at 30 degrees below zero for 30-second bursts.

papers in the United States and Germany. Everyone published the picture of a bottle of iced vodka on a bar of ice. Then the PR people finally understood. They asked me if I would be interested in their sponsorship. I would."

Before Bergqvist could say Jack Frost, supermodels Naomi Campbell and Kate Moss showed up in Jukkasjärvi with an army of a support crew for a photo shoot. Accustomed to the luxuries of haute couture, the models soon found themselves with no couture at all, posing in next to nothing at 30 below—for 30-second bursts before diving back into boots and fur coats.

Next thing Bergqvist knew, Icehotel was being featured in glossy fashion magazines, and the reservations began flooding in, most of them from Europe, the United States and Japan. Ever since, the place has been full on weekends, and even on weekdays it's not always easy to get a room. A Canadian entrepreneur, enamored of the whole concept, even showed up on Bergqvist's doorstep, so he sold the man a franchise, and now Quebec has a hotel made all of ice too. In Jukkasjärvi, winter's empty season has turned into high season, obliging Bergqvist to double his staff to 100 or so, most of them personable young English speakers who always seem to be having a grand time, whatever the evidence to the contrary.

One pitch-black afternoon at 3 P.M. I joined a group of perplexed business executives for one of these grand times. Of mixed nationalities, the execs all worked for the same German transport company and had been brought to Jukkasjärvi to "bond." (The idea behind bonding, a concept embraced by organizational behavior consultants, is that making people miserable together somehow leads to increased profits.) Muffled up in polar explorer suits, they stood in a glum circle in the dark waiting for the guide, stamping their feet and exchanging disabused comments in a fascinating array of English accents. Within minutes they had bonded around a consensus: murder the guy who had thought up this bright idea.

The recreation that afternoon was a snowmobile ride. Mounting our humming black chargers, we roared out in single file behind our leader, gasping for breath beneath an onslaught of super-chilled air. Over the river and through the woods we sped, but grandmother's house was nowhere in sight. After an hour of admiring the darkness, we were back, wondering if there was anything left of our extremities. (Had we not snowmobiled, we could have gone on a dogsled ride, journeyed to a mountain for a cup of coffee in a tepee or enjoyed a sauna before leaping naked through a hole in the ice into the river. Swedes sure know how to have fun.)

So what is it like to sleep in a freezer? To begin with, I defy anyone to feel cold at 20 degrees F in the Jukkasjärvi snowsuit, but just to make sure, Bergqvist's staff won't let you go to bed without having a sleeping bag

"It's not life threatening if you stay in for a few minutes," says Hans-Peter Strand, of the Torne River's icy waters, which he braves nearly every winter day. Master of the Icehotel sauna (the cabin), Strand urges all visitors to take the plunge and to warm up afterward in the hot tub (left of the sauna). Whether you do it in the altogether is, of course, up to you.

I was awakened at 7:30 A.M. sharp by a chirpy young woman brandishing a bright smile and hot lingonberry juice.

lesson: boots outside, please, but keep a hat on your head, and don't forget to zip your bag. They didn't exactly tuck me in, but they might have had I sniffled a bit. They even advise you to wait until the very last minute to use the heated communal bathrooms, as there are, for obvious reasons, no facilities in the rooms.

Once you've followed the instructions, navigating the layout of the hotel is a cinch. I had envisaged my place of repose as a king-size ice cube, but my bed turned out to be a raised platform of ice and snow topped by a mattress on a wooden platform, the whole thing spread with a pretty array of reindeer hides. After a quick shiver to get my boots and the outside layer of clothing off, I zipped myself up tight into my arctic bag and soon discovered that I was too hot. Off with the sweater. The sound-absorbing snow made my alcove as silent as a tomb, and before I knew it I was dreaming of sugarplums. Opening an eye now and then during the night, I found the room still bathed in the light of a flickering wall candle and the eerie glow of my own bed frame, blue-lit from within by a 10-watt halogen bulb.

I was awakened at 7:30 A.M. sharp by a chirpy young woman brandishing a bright smile, a cup, and a thermos full of hot lingonberry juice, a local specialty. I drank it down, pulled on my boots and sweater, and discovered that I smelled strongly of reindeer. As I checked out, I was presented with a certificate with my name printed in bold 28-point type, certifying that I had "survived a night at Icehotel in Jukkasjärvi." I called a cab and sneaked off before anyone could make me jump into the frigid waters of the Torne River through that jagged hole in the ice. I'm sure it's great fun, but I'll leave that for the Swedes and the honeymooners.

Regular contributor Rudy Chelminski wrote last month about tightrope artist Philippe Petit. London-based photographer Michael Freeman has shot more than 40 stories for SMITHSONIAN.

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Baby, it's cold out there, so pack your long johns. Are you ready for a journey to this land of stunning winter scenery where the taxi service is by dogsled?

THIS IS A PLACE where translucent frozen lakes and sparkling, snow-covered mountaintops host the occasional lynx or wolverine. It is one of the few spots on earth where the play of the northern lights is frequent and dramatic. Getting there is a breeze—if a chilly one. Round-trip economy airfares from New York to the mining town of Kiruna, by way of Stockholm, run about $700. It is a route well traveled. Author Rudy Chelminski says his taxicab driver asked him almost perfunctorily: "Icehotel?"

FOR THE ADVENTUROUS, Icehotel (www.icehotel.com or 011-46-980-66-800) will arrange airport taxi service via snowmobile or dogsled. Hint: Tie down your earflaps because those buggies—motorized or dog-powered—zip along. Once at the hotel, you might consider booking both cold and warm accommodations—the better to keep toasty during non-sleeping hours. Ice-carved rooms or suites run from $185 to $280, including snowsuit and thermal sleeping bag. Normal heated bungalows range from $50 to $160. (A new Ice Hotel, a.k.a. Hôtel de Glace, a franchise of the Swedish establishment, is located just 25 minutes from Quebec City, Canada, www.icehotel-canada.com or 877-5050-0423).

◆ **INSIDE TIP:** The coolest activity is the ice sculpture class, but they take only four persons per class, so be sure to call ahead.

◆ **CHOICE COLLECTIBLE:** Look for the richly decorated welded iron knives, and sheaths made of reindeer horn. Expect to pay up to $1,500 for a fine one. (Before you go, rent the acclaimed 1987 Sami film *Ofelas*, or "Pathfinder.")

◆ **YOU SHOULD KNOW:** The cold, dry climate chaps lips, so bring lip balm.

◆ **FOR THE GOURMAND:** At the Wärdshus, try the "Carpaccio of Reindeer."

ELIZABETH WOLF

The Mona Debbie.

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ARIZONA NATURALIST PINAU MERLIN CELEBRATES LIFE IN THE DESERT BY KEEPING A CLOSE EYE ON IT

BY T. EDWARD NICKENS ▪ PHOTOGRAPHS BY LYNDA RICHARDSON

NOT LONG AGO IN ARIZONA'S Rincon Mountains, I watched Pinau Merlin try to entice a female tarantula out of its hole. Tarantulas dig burrows that extend nearly a foot into the ground. They cover up the burrow entrances with a film of silk produced by a specialized gland. Holding a dried stem of skeleton weed, Merlin meant to imitate a randy male tarantula, which, for her, was no mean feat.

Pinau Merlin is a slight and trim, delicately boned woman of 48 with short caramel-colored locks of hair. Male tarantulas are about three inches wide and live up to 13 years. In the very last year of his life, the male spider goes courting. He locates the burrow of a female, then gently strokes the film of silk over the entrance with a pair of leglike appendages. "It's something like this," Merlin whispered, strumming gently with her dried stem. Nothing happened. She tried again. No sign of movement. Next Merlin tapped the ground, simulating a male spider tap-dancing. Tap-tap. Strum. Tap-tap. But this tarantula wasn't budging.

I was only mildly disappointed. My eyeballs were ready for a break. In the previous three days we had scaled rock bluffs high in the Rincons, following rivulets of water from tiny pool to tiny pool to spy on Gila monsters coming down to drink. We'd crept up soaring dirt cliffs to glass great horned owl chicks staring amber-eyed from their roosts. We'd hiked across creosote bush flats and cholla fields and through saguaro forests to watch ants, bees, wasps, lizards, ground squirrels, cactus wrens, caracaras and assorted snakes dive into, peer out of, attack prey and copulate in various

tunnel VISION

Merlin can identify a tarantula hole, even one made by a photographer, from outside.

holes, dens, burrows and depressions.

Merlin likes to watch things, and she especially likes to watch holes in the ground. Big holes, little holes. Ant holes, perhaps, or pack rat holes, badger holes, bumblebee holes. Mysterious holes for which there are no obvious residents or explanations.

One morning, driving through the vast Tohono O'odham Indian reservation west of Tucson, Merlin and I stopped to check out a caracara nest high in a multiarmed saguaro. Walking across red soil that stretched like taffy to the limits of vision, she stopped frequently to examine tracks or cock her head. "Shh, *shhhh*. Hear that?" It was the dry click-click of a rattlesnake's rattle as the creature crawled unseen through a tangle of hackberry. Then: "Look, look, see it? That's the scat of a lizard, a big desert spiny, I'd bet." Here, she pointed out a javelina trail; there, the tail drag of a kangaroo rat. In the same sentence she used the phrases "too cute" and "zygodactyl foot" to describe the X-shaped track of a roadrunner.

Within one 20- by 20-foot square, Merlin pointed out dozens of polished, inverted cones—the emergence holes of solitary bees—plus a harvester ant mound, 25 burrows of kangaroo rats, a kit fox den, 14 desert pocket mouse burrows and the turreted entrance to a wolf spider burrow. Each clump of cholla and every hummock of mesquite was pocked with holes, and as far as I could see, some 80 miles into Mexico, the land appeared to be a nearly uninterrupted sweep of similar habitat, riddled with the doorways to subterranean nations.

"The more you know about what you see, the more you come to appreciate the intricacies of life, and the fantastic ways that animals have evolved to live in specific environments," Merlin said. "And looking at holes is a great way to get to know the neighbors. You see rabbit fur by the kit fox hole, and it's like reading the morning paper. Who was out last night? What were they doing?"

Some people might consider the act of watching holes in the ground an unfruitful enterprise, but more than 6,000 enthusiasts have bought Merlin's *Field Guide to Desert Holes*. Published two years ago by the Arizona-Sonora Desert Museum, just outside Tucson, it's now in its second printing and is being distributed nationally. Her second book, *A Guide to Southern Arizona Bird Nests and Eggs*, came out this past spring.

Merlin is a naturalist, not a scientist. She has made no earthshaking discoveries about holes in the ground. But just as Roger Tory Peterson heightened public interest in birds with his illustrated field guides, she is bringing to light the unseen lives of the desert with hers. She tells how grasshopper mice "howl" in the desert like tiny wolves, for example, and describes the "little crunching noises" that come from the tarantula's burrow when the spider crushes its prey.

"Pinau Merlin is emerging as a true voice for the Sonoran Desert," says Steven Phillips, publications manager for the Arizona-Sonora Desert Museum. "She sees things out there that you just can't believe, and she has this gift of pulling the story of landscape together." She is "an incredibly observant person," says Don Swann, a wildlife biologist at Saguaro National Park.

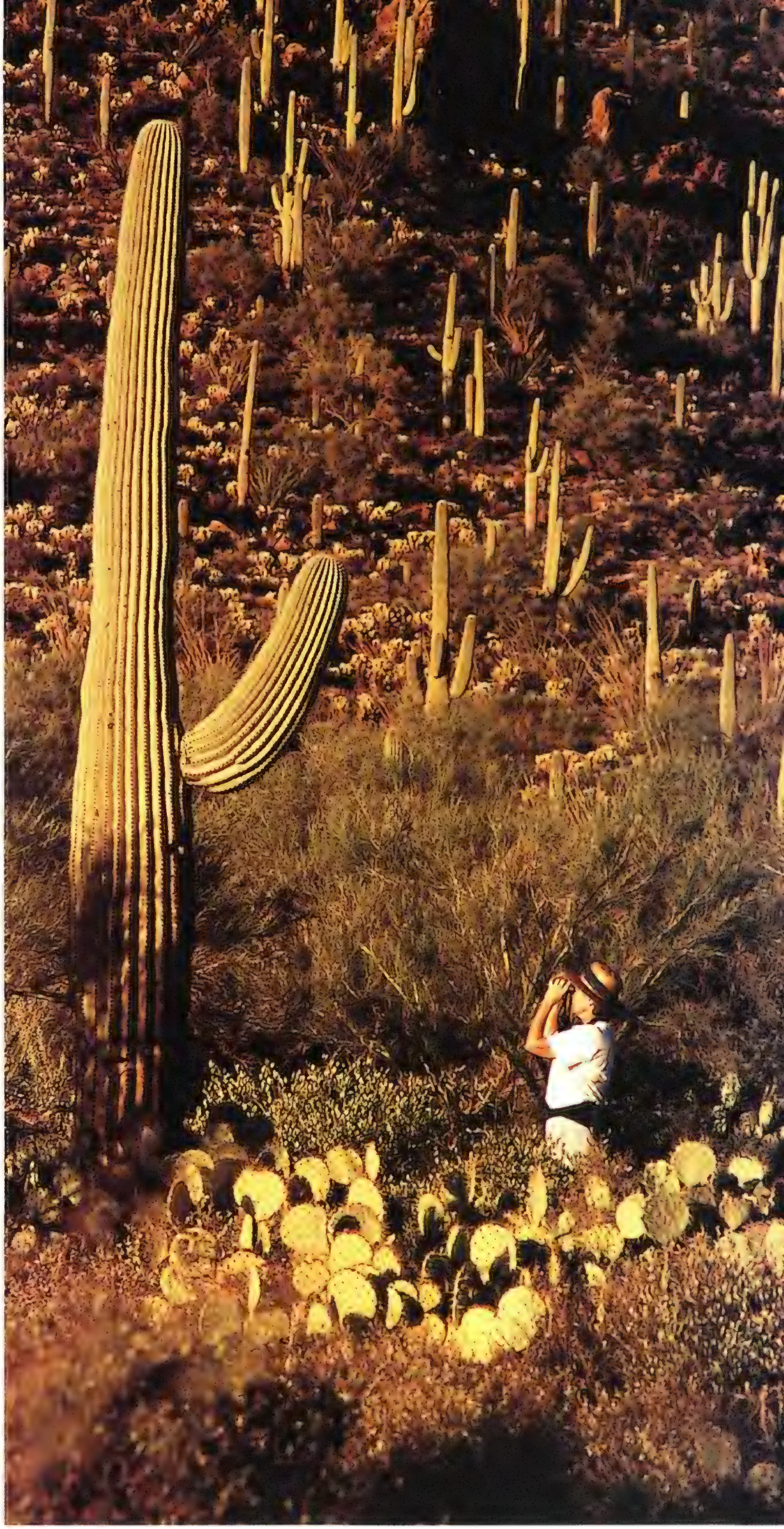
The Sonoran Desert sprawls over

What goes down must come up

A desert tortoise (emerging from its den) may use the same burrow for many years.

The burrowing owl adapts the dens of coyotes and other animals for its own use.

When a rock squirrel meets a snake, it may attempt to push sand or dirt at its face.



Merlin (looking for woodpecker holes in saguaro cacti) has napped beside rattlers.

100,000 square miles of Arizona, California, the Baja California peninsula and much of the Mexican state of Sonora. It consists mainly of sand, cactus forests and dry streambeds lined with paloverde trees. Some parts have gone three years with no rain whatsoever. Surface temperatures sometimes approach 180 degrees F.

To survive in such an environment, most creatures rely on some sort of burrow, soil depression or mound. Animals dig to escape heat, compensate for moisture loss and avoid predators. Pack rats pile desert litter into large insulating heaps, for example, then tunnel under them. Certain solitary bee species sometimes dig brood cell tunnels eight feet deep. Couch's spadefoot toads (actually, they are frogs) burrow into moist, sandy soil with a pair of toenail-like "spades" along the base of each hind foot, then nod off for most of the year. Burrowing owls, longnose snakes, kit foxes, coyotes, antelope squirrels, scores of reptiles and amphibians and hundreds of insect species all dig, or appropriate, holes in the ground.

Then comes the fun part—the myriad and ingenious ways desert hole dwellers take advantage of their digs. For example, it is believed that the reason tarantulas seal their burrows each morning with silk is to hold on to the night's humidity. Kangaroo rats cart dry seeds into their burrows, where the seeds absorb moisture, and then eat them. Pepsis wasps, also known as tarantula hawks, use desert holes as incubators for their offspring. Females sting tarantulas and inject a paralyzing venom. The wasp then drags the spider to its burrow, stuffs it in and lays a single egg on its body. When the egg hatches, the larva feeds on the still living (but not for long) tarantula, pu-

To check out a tortoise burrow, Merlin (with Park Service wildlife biologist Don Swann) uses a handheld mirror to reflect light into it.

pates and emerges from the burrow as an adult. Merlin has found all of this fascinating since she was a little girl.

She grew up in Boston. When she was 12, she visited an older sister attending college in Tucson and immediately fell under the desert's spell. "It was very, very beautiful to me, like nothing I had ever seen."

After graduating from high school, she spent a year studying science at the Massachusetts Institute of Technology before moving to Tucson in 1972. She had never gone hiking or spent a night in the woods. "I thought a cow would chase you down and bite you." But when friends took her to some old cliff dwellings high in Arizona's Sierra Anchas, her life changed. "I was enchanted," she recalls. "I knew I wanted to spend all my time camping and hiking and exploring." For much of the next decade, she did just that.

To support herself while wandering the desert, Merlin completed a nursing degree and worked grueling shifts in emergency rooms at city hospitals and, later, on Indian reservations. The carnage she saw left her reeling. She cut back on nursing and took up freelance writing to help make ends meet.

One day in 1982 she found a ramshackle ranch house on 115 acres of desert astride a peculiarity in southern Arizona—a permanent stream. It flowed through the 11-mile-long, 800-foot-deep Aravaipa Canyon. "I called it the Pretty Good Allright Ranch," she says, "and it was exactly that to me." She arranged to rent the place and moved in. She hiked into the canyon nearly every day and most nights.

Merlin shared her house with a menagerie. The Sidneys, a pair of canyon wrens, nested in a bathroom light fixture. Dudley, a ring-tailed cat, constantly took off with soap, underwear and a succession of Swiss Army knives, and raised kittens that stalked up Merlin's bedsheets at night. "I had no television or radio," she recalls. "There was no extraneous stuff."

Merlin tracked bighorn sheep across rocky ledges, lay down in sandy washes to see how close vultures would come before they realized she was alive (eight to ten feet, it turned out), shadowed javelinas, lizards and coyotes. During that time, she kept journals, reflected on her life's work and realized that she wanted to become a naturalist. Finally, after more than a decade of solitude, she had a yen to "reconnect"; she wanted to share what she was learning with others. She left the ranch and eventually settled into a small, plain house on the outskirts of Tucson, where she continues to make frequent forays into the desert.

"It's not easy for most people to just do nothing," Merlin said one afternoon as we rested on boulders strewn across the floor of an Aravaipa side canyon. A wren twittered overhead, nearly drowning out her soft voice. "There is this sense of having to be productive, having to justify your every moment. When I take people out to the desert now, I have them just sit, and listen, and sniff, and look." She cocked an ear toward the sound of a tree frog "bleating" up-canyon. "Usually five minutes is enough."

Some people think Merlin is, well, a bit different, but that no longer bothers her. One day she was watching an ant hole when some men rode up behind her on horseback. Bemused, one of them called out. "Hey, you just sittin' there watchin' that ant hole?" And Merlin said, "Yeah, that's about the size of it."

T. Edward Nickens last wrote about the Appalachian Trail's Fontana Dam Shelter. Lynda Richardson is based in Richmond, Virginia.

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*fresh*EYES

BY BRYAN F. LE BEAU

LIKE MOST AMERICANS FAMILIAR WITH their work, I had long thought of Currier and Ives as creators of nostalgic Christmas cards showing snow-covered villages, views of "home sweet home" and other aspects of calendar Americana. Then, in the spring of 1994, I got an invitation that led me to a major reconsideration of the printmakers' place in history.

Not long after international food services giant ConAgra acquired the Beatrice companies, a Midwestern food manufacturer, in 1990, ConAgra employees discovered crates full of old, framed prints in a Beatrice warehouse in Chicago. Uncertain of what they'd come upon, they brought in David Hunt, then of Omaha's Joslyn Art Museum, who identified the find as an extraordinary collection of more than 500 original Currier and Ives prints. It turned out that the prints had been brought together in the 1950s and '60s by a private collector, who sold them to Esmark, a Chicago-based holding company purchased in 1983 by Beatrice.

With the provenance of the collection established, Hunt agreed to help hang many of the prints in ConAgra's new Omaha headquarters. When the collection was installed, curator Hunt, who knew of my interest in 19th-century Americana, invited me to the opening. Most of what I saw confirmed my earlier impression. But then I was told about some prints in storage that the company believed too controversial to exhibit. When I looked at those prints, which included some that were very demeaning to immigrants and to African-Americans and some, intensely nationalistic, I saw that as a group, the prints provided a unique window into mid-19th-century American life. Thus began the research that formed the basis of my book, *Currier & Ives: America Imagined*, which makes the case that Currier and Ives charted not only the dreams, en-

IT TURNS OUT THE AMERICA PORTRAYED BY
PRINTMAKERS CURRIER AND IVES
WAS NOT ALL SLEIGH RIDES IN THE SNOW

In a dramatic 1862 lithograph, Union ships attack Confederate forts on the Mississippi River.

Currier and Ives' "Darktown" series and other prints played upon racism to lampoon minorities. In *A Corinthian Race*, 1883, grotesquely caricatured African-Americans competed on mules and horse, while an undated lithograph satirized Indian visitors to Washington, D.C.

thusiasms and fantasies of Americans but also the nation's biases, ambitions and fears.

Much of what we thought we knew about Currier and Ives came from collector Harry T. Peters, who published his studies in the 1920s and '30s, decades after the company had been largely forgotten. While Peters did suggest that the prints presented a "well-rounded, comprehensive, and truly representative picture" of the period, he also chose mostly to publish prints that encouraged a nostalgic view of 19th-century American life.

Peters, after all, was as much a product of his times as Currier and Ives had been of theirs, and nostalgia is what he and other Americans of the day most wanted. Largely absent from Peters' selections were Currier and Ives' harsher representations. Scholars of the day, most of whom knew only what Peters had chosen to publish, neglected to pursue the matter. It was left for us of a more critical age to take another look back at the prints and their manufacturers.

You could say that Currier and Ives got its start on the evening of January 13, 1840, when more than 100 passengers and crew perished after a Long Island Sound steamboat, the *Lexington*, caught fire. When news of the disaster reached the *New York Sun*, printer and lithographer Nathaniel Currier suggested to editor Benjamin Day that they illustrate an "extra" edition with lithographs of the sinking. Within an unprecedented three days, an illustrated special edition of the *Sun* hit the streets, a feat that gained the paper national attention and created a sizable market for Currier's timely and newsworthy prints.

By then, the 27-year-old Currier had been in business for six years. Born in 1813 in Roxbury, Massachusetts, he had become an apprentice to Boston lithographers William and John Pendleton in 1828, at the age of 15. Around 1834, Currier moved to New York, where he and John Pendleton intended to start another printing business. But Pendleton sold his share to Currier, and after another brief partnership, 22-year-old "N. Currier" found himself the sole proprietor of a lithography shop.

One of the few practical and inexpensive ways to reproduce illustrations, the lithographic process applied oil-based inks and water to a flat stone printing surface to transfer copies of an original image to sheets of paper. Though only very specialized printers—such as some who make very high quality art prints—use stones today, other aspects of the process are still widely employed. This magazine was printed with techniques that trace their lineage in part to lithography.

Attracted by Currier's skill as well as his shrewd business sense, some of the most prominent men of the period, including Henry Ward Beecher, Horace Greeley and P. T. Barnum, sought his services. Though relatively little is known about Currier, one contemporary said he possessed fine critical artistic judgment and a remarkable awareness of public taste. Another recalled that he was gentlemanly and liberal, philanthropic but not much of a joiner. Though a registered Republican, he seems not to have engaged in politics.

Nathaniel Currier's principal business partner, James Merritt Ives, was born in 1824 and raised in New York City. Unlike Currier, he was active socially and politically in the town of Rye, a New York City suburb, where he lived. As in the case of Currier, we don't know much about Ives' personal life beyond the fact that he married a sister of Currier's brother's wife, loved art and kept meticulous records. Currier's brother Charles, Ives' brother-in-law, rec-

CURRIER & IVES/SMITHSONIAN INSTITUTION PRESS (2); PP. 78, 79 GRANGER COLLECTION, NEW YORK

ommended him to Nathaniel, who hired him in 1852. After five years, Currier made Ives a partner.

A competent artist in his own right, Ives' particular talent was combining features from various sketches into a well-designed whole. This was a frequent Currier and Ives device, and many of their prints were the work of more than one artist. More important, Ives has been credited with persuading Currier to add to their inventory of timely, newsworthy events the very type of idyllic print—the daily experiences and pleasures of American life—whose sales eclipsed all others and for which the two men would be remembered.

In their choice of subjects, the pair usually avoided controversy and, when forced to take a stand, as during the Civil War, chose the Union—the side of heaviest artillery. But some prints—like those disparaging immigrants—conveyed critical, negative or at least cautionary messages, in obvious and in subtle ways, again reflecting the concerns or fears of their audience as well as their creators.

Such well-known artists as George Inness, Eastman Johnson and George Catlin contributed to the enterprise, but most Currier and Ives prints were made from paintings or sketches by little-known artists, or by artists in the partners' employ. American artists were plentiful, but young, well-trained graphic artists from England, France and Germany fueled the company's rapid expansion. English-born Frances Flora Bond Palmer was the most prolific of them all, producing a wide range of rural scenes. German-born Louis Maurer, a lithographer as well as painter, is most closely associated with Currier and Ives' many fine horse prints. Englishman Charles Parsons is best known for his clipper ships; his countryman Arthur Fitzwilliam Tait for hunting and fishing scenes. Fellow Englishman James Butterworth specialized in marine and naval prints.

Staff artists called delineators drew the pictures or copied the drawings of these independent illustrators and artists. Prints were often reworked by a team of company artists and lithographers led by Currier and Ives themselves. In a few cases, even published lithographs got reworked and reissued. In the 1848 copy of *Washington*

GRANGER COLLECTION

The lithographers' 1860s-era *Central Park in Winter* depicted the kind of nostalgic scene for which Currier and Ives would become known.

NATHANIEL CURRIER

Taking Leave of the Officers of His Army, the general raises a wineglass to toast his men. Temperance groups objected to the image, and when Currier and Ives reissued the print in 1876 for the nation's centennial, both glass and a nearby decanter were absent.

Though some of Currier and Ives' prints were sold uncolored, most were produced in black and white and then hand colored by a staff of about a dozen, mostly young women. Each colorist applied one color and passed the print on. A "finisher" then checked the print and touched it up where necessary. Larger, more expensive folios were sent to artists who worked outside the shop. Currier and Ives paid one cent apiece to colorists for the small prints, and one dollar per dozen prints for the larger folios. The smaller prints, 8 by 12 1/2 inches, sold for up to a quarter apiece (about $3 in today's value); the larger ones, from 20 by 26 inches to 28 by 40 inches, for up to $3 (about $50 today). Today a large Currier and Ives print, in good condition, can command up to $25,000 or more at auction.

Currier and Ives were the first American lithographers to establish a national and international print market, distributing the prints widely throughout Europe and even Australia. Their comic and clipper-ship prints were particularly popular in France, while customers in Germany and Great Britain preferred panoramic views and Western scenes.

Altogether, Currier and Ives created more than 7,000 prints that sold in the uncounted millions of copies—at one point 95 percent of all lithographs in circulation in the United States were theirs. Styling itself "The Grand Central Depot for Cheap and Popular Prints," the company advertised its prints as "suitable for framing or the ornamenting of walls . . . the backs of bird cages, clock fronts, or any other place where elegant tasteful decoration is required." The catalog boasted that the firm sold "the Best, Cheapest and Most Popular Pictures in the World."

But it was the variety of Currier and Ives' work that most distinguishes it from the many other commercial lithographers of the time. Currier and Ives prints included views of cities, towns and countryside; portraits of nearly all the celebrities of the day; historical prints; transportation, especially trains and steamboats; horses, especially trotters but also Thoroughbreds; sporting scenes, including hunting, shooting and fishing; elegant clipper ships and steamboats; temperance and morality prints; cartoons; sentimental and comic scenes, and more. Because of Currier and Ives, mid-19th-century America was documented more completely than any other time and place in history before the widespread use of photography.

It was photography that led to the firm's demise. According to James Ives' son Chauncey, as reported by Harry Peters, one day in the 1860s, Nathaniel Currier's old friend P. T. Barnum strode into the store with midget Tom Thumb on his shoulder to discuss a new lithographed portrait of Thumb to use for promotional purposes. In the middle of the conversation, Thumb interrupted: "Barnum, I have a better idea. Let's go uptown to Sarony, and I'll pose for a photo. He does all the big boys, and these old lithos are out of date."

By the 1870s, newspapers and illustrated magazines such as Frank Leslie's *Illustrated Newspaper* and *Harper's* had taken over the job of providing the public with pictures. New kinds of images—reproduced from photographs by the photoengraving process—replaced lithographs on the walls of American homes as well. Social change, too, played its part. The religious, patriotic pre-Civil War popular culture had yielded, after the war, to something more secular, tougher, less sentimental and more sophisticated.

JAMES MERRITT IVES

GRANGER COLLECTION (3)

In a time when horse racing was one of the most popular sports in the nation, Currier and Ives sold many thousands of prints such as *Peytona and Fashion*, depicting a match race of May 13, 1845. In it, Peytona defeated Fashion for the then huge $20,000 purse.

Currier and Ives continued to publish its *Celebrated Mammoth Catalogue* until 1894, and there were times when events revived interest in the company's prints. But overall, the demand for cataloged prints, and consequently the production of new prints, fell off dramatically. Nathaniel Currier had retired from the firm in 1880 and died eight years later, to be succeeded by his son Edward. James Ives remained active until shortly before his death in 1895. He was followed in the business by his son Chauncey. In 1894 the firm had moved its retail shop to Fulton Street, and in 1896 it closed altogether, though the main office moved into the Spruce Street factory building. The last known prints with the Currier and Ives imprint, covering the Spanish-American War—such as Teddy Roosevelt and the Rough Riders and the USS *Maine* before it was blown up—were issued in 1898.

Some have suggested that Currier and Ives were America's preeminent romantics, that they "schooled our citizens in what it meant to be American." Others say the images of the United States the pair peddled abroad amounted to artistic imperialism. My own view is that Currier and Ives were all of these things and more and that their work was the product of a consensus between themselves and the buying public. Moreover, the pair helped 19th-century Americans—their confidence shaken by war, reconstruction, unrest and economic hard times—believe that American resilience would ultimately triumph. It was a service that, then as now, cannot be underestimated.

Bryan F. Le Beau's new book, Currier & Ives: America Imagined, *was published in November by the Smithsonian Institution Press.*

Writer of the Purple

ZANE GREY WENT WEST, FELL IN LOVE WITH THE DESERT AND REDEFINED THE MODERN COWBOY NOVEL ◆ BY JAKE PAGE

The tips of the cottonwoods and the oaks waved to the east, and the rings of aspens along the terraces twinkled their myriad of bright faces in fleet and glancing gleam. A low roar rose from the leaves of the forest, and the spruces swished in the rising wind. It came in gusts, with light breezes between. As it increased in strength the lulls shortened in length till there was a strong and steady blow all the time, and violent puffs at intervals, and sudden whirling currents. The clouds spread over the valley, rolling swiftly and low, and twilight faded into a sweeping darkness. Then the singing of the wind in the caves drowned the swift roar of rustling leaves; then the song swelled to a mourning, moaning wail; then with the gathering power of the wind the wail changed to a shriek.

—Riders of the Purple Sage

THAT'S WHAT IT IS LIKE all right when a storm hits the high country. This pioneer of the genre western nailed it. What's more, according to Princeton University English professor Lee Clark Mitchell, his words bear examples of alliteration, assonance, anaphora and parechesis. Those are terms from the study of rhetoric, the last of which is so arcane that it can't be found even in the *Oxford English Dictionary*.

Zane Grey, who wrote this description in his best-known book, *Riders of the Purple Sage*, would likely have been pleasantly surprised that more than a half-century after his death at least one scholar is taking him seriously. During his lifetime (1872-1939), most critics panned his novels even as the public ate them up. Newspaper columnist and critic Heywood Broun said the plots of any two of Zane Grey's books could be written on the back of a postage stamp. Another critic likened the ranchmen and cowboys in Grey's *Wanderer of the Wasteland* to purple cows, and added that he didn't believe in them—or the book. More recently, Jane Tompkins, professor of education at the University of Illinois at Chicago, wrote in 1992: "It's wonderful writing, but not in good taste."

Indeed, Grey's books are romantic, with prose a deep shade of purple. Torrential passions sweep through them like flash floods. Some Grey novels are also among the most popular books ever written by an American, and more than 100 movies have been made of them, according to Grey biographer Stephen J. May.

Grey has been credited with establishing the shape of the 20th-century western novel. Few plots can be found in the genre that he did not create or at least presage. But he didn't invent the modern western. That distinction arguably goes to Owen Wister, a sickly would-be classical musician and composer from Pennsylvania who went to Wyoming for his health and found the experience rejuvenating. He later wrote a novel called

Tom Mix, right, played Jim Lassiter in the 1925 film version of *Riders of the Purple Sage*, from the novel by Zane Grey, above left, circa 1895.

Prose

Grey (at far right with the Orange Athletic Club, circa 1901) drew on his years as a baseball player to write about the sport.

The Virginian, published in 1902, which depicted the vast, fresh landscape of the West as being morally, as well as physically, restorative. It was hugely successful.

And for much of the 20th century, no genre was more popular. Of the 300 million paperback books sold in the United States in one 12-month period in the 1950s, more than 100 million were westerns. Aficionados of shoot-'em-ups have bought more than 200 million copies of books by Grey's spiritual descendant, Louis L'Amour.

Who was Zane Grey? Born Pearl Zane Gray in 1872 in Zanesville, Ohio (the town having been named for an ancestor, Ebenezer Zane), he was a small, scrappy kid who never walked away from a fight—many of them to protect his younger brother from bullies. Weaned on the stories of Daniel Defoe, James Fenimore Cooper, Robert Louis Stevenson and other romantic writers, the 15-year-old Pearl wrote a story about a boy named Jim living in a cave. Pearl's father—a humorless dentist—found it, tore it up, and thrashed the author for his foolishness.

But the boy was an unreconstructed dreamer and put legs on his dreams. At the University of Pennsylvania on a baseball scholarship, Gray was one of the early pitchers to master the curveball. In one critical game, he hit a ninth-inning, game-winning home run and reveled in the role of local hero.

He followed his father into dentistry and opened a practice on the West Side of Manhattan. Night after night, he labored in his one-room apartment on short stories and articles that no one wanted. After years of rejection and discouragement, at 28, in the summer of 1900, he met the woman who would make him a success. Lina Elise Roth, 11 years his junior and known to all as Dolly, believed from the beginning that Grey (by then he had changed the spelling of his last name) was destined to be a great writer. Soon after they married in 1905, she discovered he required long periods away from her out hunting and fishing, testing himself physically in the natural world to combat his debilitating black moods.

Dolly also knew her husband needed a lot of editing, a task she took on for virtually every story and book he wrote. She also managed their financial affairs and often served as his literary agent, driving hard bargains over book and magazine contracts and, later, movie sales.

At the age of 33 Grey gave up dentistry, and after he and Dolly were married, they moved to rural eastern Pennsylvania, where they bought a house at the confluence of two rivers and where Grey could fish and write. He sold a few magazine pieces and fantasized about wide open spaces. In 1907 Grey met a colorful character named Buffalo Jones at a lecture in New York. A bison hunter turned conser-

PP. 84 AND 86 OHIO HISTORICAL SOCIETY ARCHIVES/LIBRARY; P. 85 PHOTOFEST

vationist, Jones regaled his audience with tales of roping mountain lions and treeing bears. Grey's imagination lit up like a comet. Settled in Pennsylvania, with what was the last of an inheritance Dolly sent Grey off to Jones' ranch north of the Grand Canyon in Arizona.

There Grey saw some of the most breathtaking, weird and lonely landscapes on the continent, and he was immediately and hopelessly infatuated. "Surely, of all the gifts that have come to me from contact with the West," he would later write, "this one of sheer love of wilderness, beauty, color, grandeur, has been the greatest, the most significant for my work."

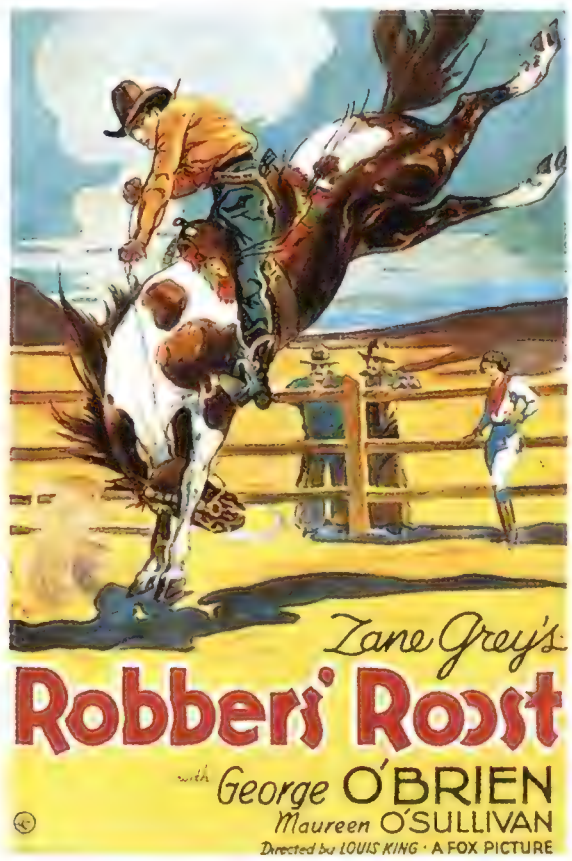
The manuscript that soon came from this trip, *The Last of the Plainsmen,* caused an editor at Harper and Brothers to inform the eager young writer that he saw nothing "to convince me you can write either narrative or fiction." A devastated Zane Grey reeled out into the street and had to clutch a lamppost to compose himself. "They" simply did not understand. He would persevere. He, Zane Grey, would hit another game-winning home run. And in fact he soon got *The Last of the Plainsmen* published by a firm specializing in books for sportsmen. Four years later, he hit a grand slam with *Riders of the Purple Sage.* Grey began showing the world that this often stark, unpredictable, phantasmagorical land was something alive—a place to test a man's mettle, even to help him find redemption.

On one of his trips out West, Grey visited Mormon communities north of the Grand Canyon in what is still one of the most unpopulated and remote parts of the United States. He admired the grit and resourcefulness of the inhabitants. But Grey disapproved of polygamy which, though no longer legal, was still practiced by Mormons in the remote areas he visited.

Needing villains for his novel (which was set in the 1870s), Grey seized upon what he perceived as Mormon mistreatment of women. At the time, stories of women captured by Indians still stirred the popular mind. The country was also up in arms about what was seen as a widespread international white slave trade. So Grey invented a cabal of back-canyon Mormons hell-bent on enslaving young women in patriarchal marriages.

Riders of the Purple Sage was published in 1912. In it, not one or two, but three females were abducted. Grey also came up with several scenes that would become standard western fare, including a heart-stopping chase over the desert on steeds of nearly mythical speed and endurance, and a mysterious stranger who arrives from nowhere to fight for right and decency.

When Westerns Filled the Theaters



More than 100 films of Zane Grey's books have flickered across the screen. *The Mysterious Rider* (1921) appeared in the silent era. Later, "talkies," including *Rocky Mountain Mystery* (1935) and *Robbers' Roost* (1933), featured some of Hollywood's leading stars.

PHOTOFEST (3)

This core element of the genre western is introduced in *Riders'* first scene. Jane Withersteen, heiress to a huge spread in the sagebrush desert of southern Utah, despairs when one of her ranch hands is threatened by a group of men led by an elder of her church. But at that very moment, Jane wheels and sees "a horseman, silhouetted against the western sky, come riding out of the sage."

He is Lassiter, a man of uncertain origins dressed in black leather and packing, as one villain observes, "two black-butted guns—low down—they're hard to see—black agin them black chaps." Lassiter's reputation runs far ahead of him in this part of the world. After some posturing and tough talk, the bad guys leave, to return another day. The lines are drawn from the outset, and the tale hurtles on, headlong as a wild cayuse.

Riders of the Purple Sage was an immediate success, selling more than a million copies on its first appearance. It was followed by ten more Zane Grey westerns in the next nine years, many of which climbed to the top of best-seller lists, a remarkable achievement. Not only was Grey a perennial best-selling novelist but, a passionate fisherman since boyhood, he wrote several nonfiction books about fishing that remain classics to this day.

In 1918 Grey moved his family—he and Dolly had two sons and a daughter—to Los Angeles. But the change of venue had little effect on his frequent black moods. On April 26, 1919, in the midst of a marathon novel-writing siege, he noted in his journal: "I have got to make a great effort to drive away the spell of blackness or sink into it. So I will go on writing!" The following day he wrote 18 pages, "a sort of triumph. . . . Work is my salvation."

In his worldwide quest for big game fish, Grey employed ultraheavy equipment. He held 14 records between 1924 and 1936.

By 1922 when he published *To the Last Man,* a fictional account of an actual feud between cattlemen and sheepmen in Arizona's Tonto Basin (to which he shamelessly adduced a *Romeo and Juliet* plot), Grey lamented the growing desecration of his beloved West: too many people were trammeling the wilderness. Even the remote and traditional Navajo were being jolted into a world they could not understand. On a nostalgic trip to Arizona with his children in 1928, he wrote to Dolly: "I shall never come back to Arizona. The main reason is that the country has been ruined by motorists. The Navajos are doomed. The beauty and romance of their lives is dead."

He took solace in fishing, which he approached with characteristic fervor. Between 1924 and 1936, in venues around the world, he caught 14 world-record specimens, including the largest blue marlin, Pacific sailfish, bluefin tuna, striped marlin and tiger shark caught on rod and reel. He was also a philanderer, taking young women with him on most trips afield, a painful reality to which Dolly evidently made a private, working accommodation.

By the mid-1920s, Grey had become a major celebrity, and a self-absorbed and difficult one at that. He bought a house on Santa Catalina Island, a renowned fishing mecca, overlooking the property of none other than Tom Mix, the king (as coincidence would have it) of the movie western. The scene of many late-night parties, Mix's house was often bright with lights, including a large flashing M on the roof. Grey grew so furious with his noisy, flamboyant neighbor that he sold his house and built another farther up the hill. For years after, he ignored Mix, even though the actor starred in a number of movies based on Zane Grey books.

By now Grey was a wealthy man. Movie sales added to his wealth, and (Tom Mix notwithstanding) he took this new medium seriously, even forming his own production company. True to his devotion to the real landscape of the West, he insisted that movies based on his books be shot on location or as close as possible. He was fond of Monument Valley, which John Ford and John Wayne would later turn into the quintessential backdrop for such western classics as *Stagecoach* (1939), *She Wore a Yellow Ribbon* (1949) and *The Searchers* (1956).

In the early 1930s, he bought a yacht almost 190 feet long, which he elaborately refitted at staggering cost and staffed for fishing expeditions to the South Pacific. He sailed to Tahiti where, after a petty squabble, he fired his captain. Arriving later in Suva in the Fiji Islands, he got word from Dolly that the Depression and boat expenses had hit them hard. He was to return home immediately. To his companions, he called her letter the "Suva mandate" and, with world-class crankiness, accused her of being "disloyal" for

BROWN BROTHERS

Dolly (at home on Santa Catalina Island in 1936 with sons Loren and Romer and Romer's wife, Billye) believed in her man.

bearing such ill tidings. But before Grey even returned home, Dolly had sold another one of his books.

Still churning them out, often two a year, and traveling far and wide, he took to subordinating both character and setting to plot, working more and more to the formula he had invented: the passion was gone but he persevered and ultimately prospered again, spending much of what he earned on ever more elaborate fishing expeditions.

By the time of his death in 1939 from a heart attack at age 67, Grey had written 89 books, one of the last a formula western set in Australia. Some were manuscripts that Dolly edited and had published after his death.

Meanwhile, of course, others had been copying him. As early as 1917, a young writer, Frederick Schiller Faust, took on the name Max Brand and, from Italy, wrote a passel of westerns, including *Destry Rides Again*. Many by Frederick Dilley Glidden, a.k.a. Luke Short, appeared in the 1930s. (A real gunfighter named Luke Short had had his day, but Glidden appears never to have heard of him.) Though they adopted short, punchy two-syllable names, neither author approached Zane Grey's early rhetorical wildness, color and violence. As Princeton professor Mitchell puts it, "so successful were the innovations Grey introduced . . . that he all but single-handedly confirmed the shape of a powerful new narrative form." Or, as mystery writer Erle Stanley Gardner once wrote, Grey "had the knack of tying his characters into the land, and the land into the story."

Today, Grey's Old West is dismissed as a place that never existed. Revisionist historians have focused on the "real" West as a place of sexism, racism, pointless violence and the willful destruction of natural resources. And yet the Old West—fiction or fact—continues to exert a powerful hold on the American psyche. Western novels keep selling. Books by Louis L'Amour (who grew up in North Dakota and actually knew a lot about horses, guns and surviving in the wilderness) still fill many a supermarket rack. There is a Louis L'Amour book club, just as there was once a Zane Grey book club. But just why do these tales still continue to entrance?

Maybe it's because all of us feel a bit hemmed in by a world of increasing complexity, of too many people and too many choices. Maybe we all have to deal with too much ambiguity, too many shades of gray. On the other hand, maybe it's simpler than all that. Maybe it's just because westerns are fun.

Veteran SMITHSONIAN *contributor Jake Page lives in New Mexico. His last piece for this magazine was about aspirin (August 2001).*

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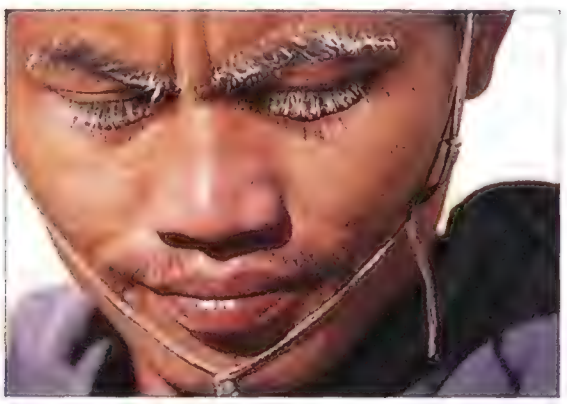
Miners carrying well over 100-pound loads must climb some 700 feet out of the crater.

A LONG-OUTDATED APPROACH TO SULFUR MINING SENDS HUNDREDS OF JAVANESE WORKERS DEEP INTO THE CRATER OF AN ACTIVE VOLCANO ◆ PHOTOGRAPHS BY JUSTIN GUARIGLIA

Fire & Brimstone

Immense callouses form on shoulders of workers who balance loaded wicker baskets of sulfur on bamboo poles while they negotiate the volcano's steep slopes.



EVEN A DANTE OR A MILTON would be struck dumb: inside the crater of the Kawah Ijen volcano lies a landscape bereft of life. A turquoise lake of sulfuric acid bubbles like a sorcerer's cauldron, and the earth belches great plumes of acrid smoke. Here on the eastern end of Indonesia's island of Java, men venture daily into this 7,500-foot volcano's maw in search not of fire but of brimstone, the ancients' term for sulfur.

"The fumes are the worst," says Hong Kong-based photographer Justin Guariglia, who captured this hell on film. The rank odor of sulfurous vapors hints at something primal and forbidden. On one occasion, a surge of steam and sulfur dioxide enveloped Guariglia and nearby workers in a matter of seconds. "Everyone started choking," he recalls, "and there was nowhere to go and nothing to do but clamp a handkerchief to your face and hope for the best." After what seemed an eternity but was actually only a few minutes, the steam dissipated.

Although a late-19th-century process made harvesting sulfur from volcanoes obsolete in most of the world, the Indonesians still run a primitive mining operation here. They employ a technique that uses ceramic pipes to condense the volcanic gas into an amber liquid that dries to form large stalagmites of pure, yellow sulfur. Dozens of miners hack them into pieces with long metal rods, load them into wicker baskets and begin the precipitous ascent out of the crater. The men will make two round-trips every day from the shores of the acid lake to the unloading station and back.

Although the sulfur dioxide fumes corroded the anodized finish on Guariglia's camera equipment, many of the men have labored here for more than a decade without showing signs of serious illness. And the money—less than $2 a day—is far better than most jobs on this poor and overpopulated island. One day, however, these men may climb Kawah Ijen to discover not brimstone but fire, when this still-active volcano decides to erupt.

—John F. Ross

Inside Kawah Ijen, which contains one of the world's largest hot acidic crater lakes, the sulfur workers tie scarves and handkerchiefs across their faces to protect against the caustic fumes. This sulfur may be used for refining raw sugar, processing natural rubber, or as an ingredient in medications and pesticides.

Workers place foot-in-diameter ceramic tubes directly into the midst of steaming volcanic vents inside the volcano's crater. The tubes condense the thick sulfur dioxide gas into an amber liquid, which pours out onto the ground and solidifies into pure sulfur. Using long metal rods, the men break up the sulfur into smaller pieces for transport out of the volcano.

Whales on Moun

taintops

A GREAT FOSSIL FIND HIGH IN THE CHILEAN ANDES BEGAN WITH A DELAYED FLIGHT IN NEW YORK CITY AND ENDED WITH A HORSEBACK RIDE FROM HELL

"Some have said I'm too young to write an autobiography," says paleontologist Michael Novacek, 53, "which at least gives me comfort for a long and happy life." Fortunately, Novacek, who has discovered important fossils on virtually every continent and is provost of science and curator of paleontology at the American Museum of Natural History, ignored the naysayers. In *Time Traveler: In Search of Dinosaurs and Ancient Fossils from Montana to Mongolia*, to be published in February 2002 by Farrar, Straus and Giroux, Novacek anticipates the story he told in the well-reviewed *Dinosaurs of the Flaming Cliffs* (1996). "After writing about my work in the Gobi Desert, I wanted to look back to my earlier expeditions," he says.

In the new book, Novacek writes about growing up in Los Angeles in the 1950s and '60s, the son of a professional musician and a stay-at-home mom. He had run-ins with his Catholic school nuns for reading concealed science books in class. For a time, playing in a rock band rivaled his passion for fossils. But his studies at UCLA, San Diego State and UC-Berkeley, where he got a PhD in paleontology, turned what he calls his "childhood of dinosaur dreams into a paleontological career." In the following exclusive excerpt, Novacek paints a vivid behind-the-scenes picture of the vicissitudes of paleontological fieldwork, in this case his 1986 and 1987 expeditions in the southern Chilean Andes, a region until then little explored. His fossil finds, Novacek says, "represented, at the time of their discovery, the first diverse ancient mammal assemblage from the region and helped geologists estimate the rate of the rise of the Patagonian Andes. Because the fossils are only 15 or 16 million years old, they demonstrate that a shallow seaway extended all the way from the Atlantic to eastern Chile." Nearly as important, he adds, "Chile taught me to leave no stone unturned. We found fossil treasures there in the most unlikely and isolated spots."

FOR YEARS I HAD HEARD ABOUT blind luck, triumph, and fame in paleontology. A well-known skit mimicked an acclaimed fossil researcher as he twirled in a drunken stupor and literally stumbled over a famous early, humanlike primate skull. Stories were told about how people found important dinosaurs in their own backyard or, like paleontologist Jack Horner, identified bits and pieces of baby dinosaurs in a coffee can in a rock shop. One of the most popular tales was about George Olson, a member of the illustrious American Museum of Natural History Central Asiatic Expedition under the famous Roy Chapman Andrews in the summer of 1923, who tripped and tumbled down a slope at the Flaming Cliffs in Mongolia and nearly landed on the first nest of dinosaur eggs known to science. My experiences in paleontology, by comparison, lacked any sudden serendipitous discovery. Soon, however, I was to have my own encounter with good luck, an event that was to redefine our field explorations for more than a decade and to open up a whole new region of the world for the study of vertebrate fossils.

It began one autumn morning in 1984, the day that Dr. Paul Raty, a veterinarian on his way from his homeland in southern Chile to see relatives in Belgium, paid me a visit. On his departure from Chile, his uncle told Paul that if his flight were delayed, he should visit the American Museum of Natural History in New York and tell whoever now worked there about some of the interesting things the Chileans had recently found. When the departmental secretary rang me to say that there was a man from Chile who wished to see me, I went down to the great rotunda to greet my visitor. In halting English, Raty told me that he wanted to show me some pictures of fossil bones. He was a pleasant, shy fellow whose smooth skin hardly suggested his upbringing on one of the world's

Novacek (with "friends" at the American Museum of Natural History) says the fossils he has collected represent "only a few steps in the grandest experiment of all—the 3.5-billion-year evolutionary history of life on earth."

Excerpted from *Time Traveler*: Copyright © 2002 by Michael Novacek

rawest frontiers. On our way up to my office, we passed through the dinosaur and ancient mammal halls, where the great skeletons glared like angry, awakened gods above throngs of hundreds of clamoring school kids. Paul stopped at a mammoth skeleton and pointed to one of the largest vertebrae. "*Mismo*"—the same—he said cryptically.

Once in my office, he pulled out some crude color photographs showing large spool-like fossil vertebrae. "These are vertebrae, probably fossilized," I said. Paul did not register surprise. He was a vet and he knew his bones. I looked more closely at the pictures. "They are actually whale vertebrae, big whales," I continued, "at least tens of millions of years old. They're well known along the coasts of Argentina and Peru, and I'm not surprised to see them along the Chilean coast too, especially in the north."

Paul said nothing; he just shook his head. I was ready to escort him out of the office, but he stood there so expectantly that I had to ask, "Did you find these in Peru or northern Chile?" He shook his head again, and I led him down the hall to the Osborn Library. I brought out a large folio atlas and opened it to Chile. Paul tentatively dragged his finger down along the spine of the Andes, bringing it to rest on a mountain just south of a large lake in the southern part of the country. The summit was about 10,000 feet in elevation.

"There? In those mountains?" I stammered.

For the first time Paul nodded.

"Are you sure?" I did not want to insult his credibility, but the idea was just too crazy to accept. To my knowledge there was no record of a fossil whale beached that high on an Andean summit. This had strong implications for the history of South America and one of the earth's tectonic paroxysms, the vertiginous rise of the Andes. Had that episode of rampant mountain building ripped up old coastlines and elevated them to the stratosphere?

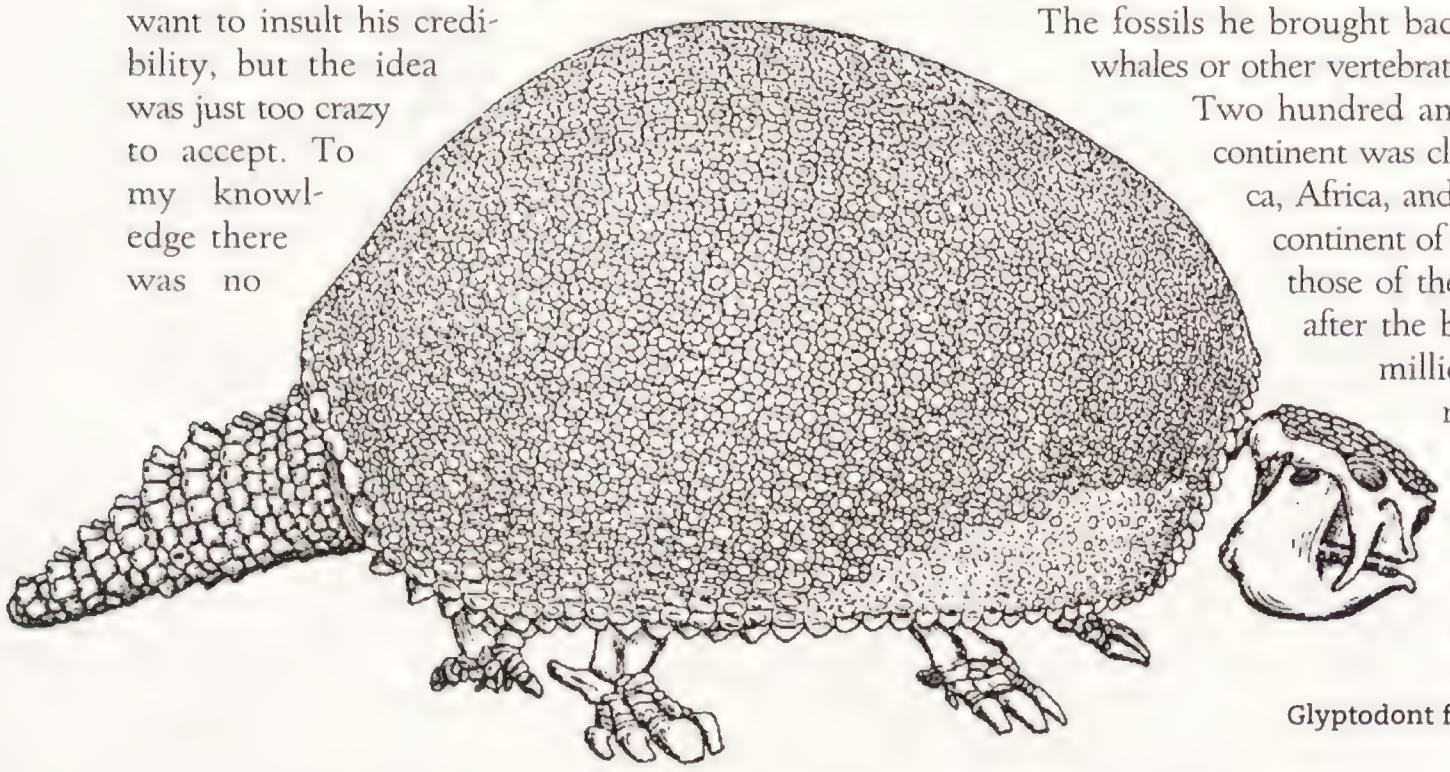
"We'll be right down," I said. I smiled and shook Paul's hand. He apparently interpreted my words literally because after a couple of months I received a tattered letter expressing anxious anticipation of our imminent arrival. But it was impossible to raise the money for an expedition on short notice, and the good weather had already passed. It was not until January 1986 that I was able to leave New York with a small crew and fly to Chile Chico.

Like its sister continent in the Northern Hemisphere, South America is rich in fossils and has attracted a long line of fossil hunters. Not the least of these was Charles Darwin. Between 1832 and 1834 Darwin cruised on the *Beagle*, making stops along the Argentine coast, collecting the fossil bones of giant sloths and armadillos. In speaking of the fossils of Patagonia, Darwin wrote that he was collecting "a perfect catacomb for monsters of extinct races."

We were not picky about our prey, interested in scarfing up any kind of dinosaurs, mammals, or crocodiles we could find in any new, rich fossil territory.

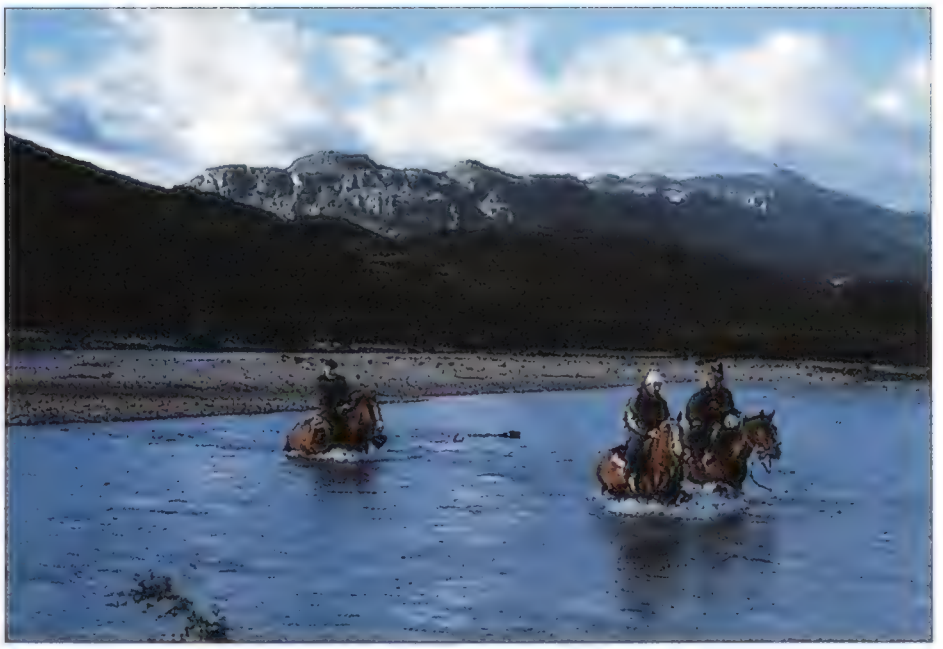
In July 1834 the *Beagle* cast anchor at the Chilean seaport of Valparaíso. From this point Darwin explored, on the back of a mule, the high mountain passes of the Andes. Here he found evidence of fossil marine creatures as well as petrified pine trees in marine rocks, which indicated that the land was once submerged under the ocean and then raised 7,000 feet. The fossils he brought back did not, however, include whales or other vertebrates.

Two hundred and fifty million years ago, this continent was closely sutured to North America, Africa, and Antarctica in the great supercontinent of Pangea, and its fossils were like those of the neighboring land areas. Even after the breakup of Pangea around 200 million years ago, South America remained part of the Gondwana complex that included Africa, India, Antarctica, and Australia. Conversely, its connections with the Northern Hemisphere were intermittent and



Glyptodont fossils date back 25 million years.

VERTEBRATE PALEONTOLOGY BY A.S. ROMER. UNIVERSITY OF CHICAGO PRESS, 1966; P.98 FREDERICK C. CHARLES



En route to the Pampa Castillo site, the Río Chacobuco was deceptively tame.

its dinosaurs and mammals evolved on other paths than those of Asia and North America.

By the late Cretaceous period, some 70 million years ago, South America had become a gargantuan island. There in the southern half of the world, floating free, South America became its own evolutionary experiment with a fauna that evolved over 65 million years in what George Simpson, one of the most influential paleontologists and evolutionary biologists of the twentieth century, called "splendid isolation." South America harbored marsupials, the fossil relatives of opossums and pouched kangaroos, which diversified into mammals of all shapes and habits. Large, carnivorous forms included saber-toothed marsupial "cats." The earliest edentates, the strange group of sloths, anteaters, and armadillos, thrived. There were other mammals such as notoungulates, hoofed animals that were dead ringers for horses, camels, and antelope in the north but not related to these northern forms.

But about three million years ago, the sea level fell and brought together a string of islands along the spine of Central America. These islands became the present-day isthmus of Panama and formed a bridge. That event, euphemistically called the Great American Interchange, was actually more of a one-way massacre. From the north, a great tide of carnivorans, rodents, and hoofed herbivores moved south to the reconnected continent. This invasion led to the extinction of many of the resident forms in South America, especially marsupials and notoungulates.

Half of the mammalian genera living today in South America are descendants of these North American invaders. Conversely, about sixteen southern genera migrated north, of which only five gained any foothold in North America—the nine-banded armadillo, opossum, porcupine, and two other kinds of rodents. Why such an uneven outcome in an exchange of animals between two continents? Whatever spawned their diversity and caused their demise, the South American land vertebrates—from dinosaurs to didelphid opossums—have been an object of fascination for paleontologists, and my colleagues and I at the museum enthusiastically shared their fascination.

We were not picky about our prey, interested in scarfing up any kind of dinosaurs, mammals, crocodiles, or turtles we could find in any new, rich fossil territory. As a result, we were first on the track of these fossil whales that were curiously stranded high in the Andes and introduced to us by Paul Raty. The whales were probably of Miocene age, about 16 million years old and about 11 million years older than the Great American Interchange. We also knew that the southern Andes was not only one of the world's wildest places but a vast unexplored pile of sediment—in some places 20,000 feet high—built from layers upon layers of rocks. Those rocks represented ages that extended from the time when South America was just the southwest bulge of Pangea.

On January 3, 1986, we left Kennedy for Miami and then took an eleven-hour flight to Buenos Aires. Besides myself, our group included paleontologists John Flynn, Mark Norell, and Andy Wyss, as well as another curator at the museum, Malcolm McKenna. By early morning of the following day, I looked down on a huge, muddy river slithering like an anaconda through a land of dark green shadows. There was the Amazon, the greatest freshwater irrigation system on earth. I was on my way to the far end of a continent whose mystery and vastness were both awesome and intimidating. As we flew from Buenos Aires to Santiago, we crossed the Andes and seemed to graze the side of Aconcagua, at 22,841 feet the highest summit in the Western Hemisphere. The surrounding peaks were alive with a diamond rind of snow, but their slopes descended into raw, ashen valleys where dark green blotches represented clusters of enduring vegetation.

As we stepped out of the plane in Santiago, the dry heat massaged our bodies, cramped and stiff from the long flight. Grabbing heavy rucksacks, we plowed through the crowds looking for our welcoming party. Our hosts had no trouble recognizing us. The paleontologists Patricia Salinas and Daniel Frazinetti (the latter was going to accompany us to Chile Chico) greeted us warmly.

Our next flight was a magnificent 1,100-mile journey down the spine of the Andes, passing over mountains cloaked in mist, dark forests, and fiords bordered by glaciers that seemed to flow below us in scallop-shaped waves. After 400 miles, the earth below became more barren and rough-edged. The plane took a nosedive toward the airstrip at Balmeceda, straight into a wind that seemed strong enough to shred a windsock. This was the land of the

MICHAEL NOVACEK

Novacek's treacherous escape from Pico Sur traversed slippery volcanic terrain.

"roaring forties," the most notorious and persistent winds on earth. People appeared impressively oblivious of the wind as they went about their business offloading heavy sacks of flour and cumbersome boxes. I tried to imagine a normal existence with a gale blowing every waking minute.

We then boarded a twin-engine Cessna loaded to the gills. The pilot, a nervous but pleasant chap, anchored the bulkier of us into the plane's center of gravity and secured everything with a foreboding complexity of straps and ropes. As we took off, we could feel the plane stall and seemingly float backward in the wind. Malcolm, an amateur pilot with many years' experience, was white-knuckled as he observed, "The stall light's been on for the entire takeoff!" The Cessna barely crested the mountains south of Balmeceda, but the wild flight did not distract us from one of the most stupendous geological landscapes any of us had ever viewed from aloft. Lago Carrera, which straddles the Chile–Argentina border, is ensconced within the arms of huge peaks hung with silver glaciers. To the south are austere black needles of eroded volcanoes. And all around are layers of rocks—pinks, browns, gray-green—hundreds of square miles of rock, perhaps many of them with fossils and virtually none of them ever walked over, let alone prospected. Several lifetimes of fieldwork stretched out below us.

After landing in Chile Chico, we took a cab to town, where we were greeted by a very jolly mayor, Carlos de Smet de Olbeck de Halleux, who soon saw that we were now barely conscious after our marathon twenty-four-hour trip. He clapped his hands and ordered our cab to take us to the Nacional, the only hotel in town. The next morning at the mayor's house maps were opened and geological colors indicated rock formations that stretched for miles in every direction. With the help of Carlos and Paul Raty, his nephew, we identified two targets. The first was Pico Sur, south of Chile Chico, the mountain where the whale bones had been recovered. We would take nine people, including two guides, on horseback. The second target required a boat trip along Lago Carrera about fifty miles to a small outpost, Mallén Grande. Information on fossils from this remote area was sketchy but intriguing.

Then came four days of waiting while horses were gathered, shoed, and supplied. Finally, the Pico Sur expedition left, at 7:00 a.m. on January 9 in an open pickup that took us to an *estancia* where we loaded up our hyperactive packhorses, *pilcheros*, with our supplies. We started up a twisting trail along a huge precipice. As the hours passed, we slowly gained altitude. At 5,000 feet, I saw a world almost completely in shades of blue—the great lake, the glacier in shadow, the distant rock faces reflecting the snow, and the sky above. The horses trudged up the steep trail like laboring locomotives. Our two *baqueanos,* or guides, kept a careful eye on their condition. In the lead was Crus Vargas, a resplendent cowboy sporting a broad-brimmed flat-topped hat and a long, wicked knife, and Roberto, called Boy, in a casual wool sweater and cap. Soon, though, even the enthusiastic *baqueanos* tired. Crus ordered us to rest the horses on a small sloping shelf of grass and boulders. As I fiddled with my camera, my horse, obstinate, tired, or disoriented, suddenly buckled underneath me. I swung my right leg over the flanks of the horse, but my left foot was trapped in the stirrup. Unfortunately, the horse now stood upright again and started bucking, and dragged me over the clearing, which was studded with sharp-edged rocks. There was much shouting, including my own expressions of terror. The horse halted, but before I could dislodge my left boot it took off again. My head hit a rock just before the horse reared and seemed to come down on me, grazing my right leg.

I lay on my back with my bashed head leaning against the jagged pillow of a rock. With some anxiety I saw that my right leg was encased in bloody, shredded denim. I felt lucky to be alive. Mark and Boy came over and felt my legs. I could move both of them, a seemingly impossible outcome. Mark wrapped my leg in a tight bandage.

There was much discussion about whether I should return to Chile Chico. I protested. "The worst has to be over," I said, "we're almost there." Within an hour I was hoisted onto a trustier steed, and we ascended a steep ridge onto a plateau whose surface was cut by a maze of icy creeks. Pico Sur, a high, snow-crowned butte, lay directly to the west. At last, at 3:00 p.m., we arrived at a small meadow, our intended campsite. The wind was bitter cold and I was wrapped in every layer of clothing I had. By the time we were finished with our meal, Crus

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and Boy had constructed an ingenious shelter of tarps, blankets, sheepskin, and saddles between two rocks. The dogs and humans huddled together for warmth. I awoke the next morning with painful legs and a swollen jaw. Nonetheless, I was feeling strong enough to limp after the others up another 1,500 feet to the whale site. The fossil beds were buffy gray to yellowish, with lots of oysters weathering out on their surface. Immediately we found some big whale vertebrae in a streambed. Malcolm got a few nice shark's teeth; I found a variety of bones near some volcanic outcrops. But prospecting was annoying work in the muddy sediments. Things became worse as the wind picked up and brought in an ice storm. Mark and I quarried in winds that nearly blew us off the ridge.

My legs were stiffening in the cold and I headed down to camp. Soon I was joined by Malcolm, who brought back a choice, elongate tooth of *Isurus*, a nasty fossil shark. John and Andy straggled back to camp, speaking rather despondently about the eighty-mile-per-hour winds at the summit. But the wind had died down in our camp and we settled in for some restorative maté, the thick, slimy green tea that is a strong stimulant and staple of the South American cowboy. Dinner was a delicious stew and people were festive despite the day's meager finds.

Sometime after midnight I woke up with a need to urinate. To my alarm, I discovered that my legs were hardly functional; both knees were so stiff I could not bend them. I wriggled out of the tent into ghastly cold; the mountain meadow under a night sky was dusted with the brightest stars I had ever seen but at the moment could hardly enjoy. It was an ordeal to crawl back into the tent. As I returned to that abyssal sleep that only sheer exhaustion can inspire, I pondered my future as a field paleontologist.

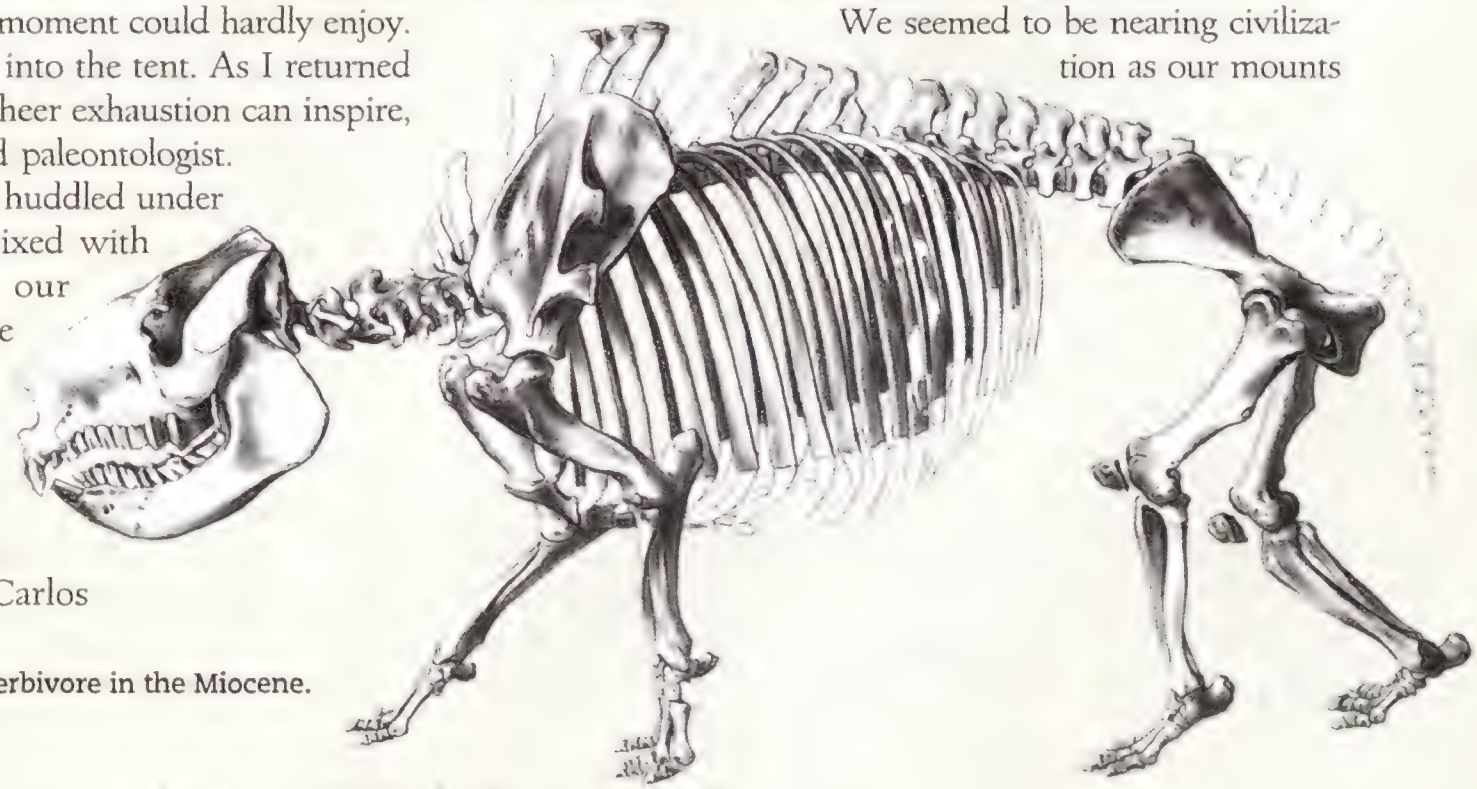
By the next afternoon, as we huddled under a pile of sheepskins, a gale mixed with snow came howling into our mountain meadow. A horse sideswiped by the wind was actually blown over. The following dawn we had to admit that the elements had vanquished us. It was indeed a desperate predicament, and Carlos advised a hasty retreat. I was lifted into the saddle with my unbendable legs. It seemed ludicrous to contemplate that my only salvation lay in another eight-hour ride.

Crus decided that the bad weather meant almost certain disaster to return the way we had come. Instead he chose a route that gave us protection from the weather but exposed us to a far more treacherous descent without a clear trail. We started east on an uncharted route; Crus rode attentively back and forth, reminding us to keep a very tight grip on the reins. My legs throbbed with pain.

At least the storm was now above us. But I could hear the rush of a cascade far below. As the ravine became even steeper, the horses planted their front feet into the soggy silt and slid down as if on skis. When we reached the torrent at the bottom of the canyon, we were ordered to dismount—an impossible maneuver for me. So I simply held my arms out in front of me and rolled out of the saddle and, unintentionally, onto a thorn bush. The riderless horses were coerced into fording the river, and we followed. I somehow managed, with the help of Andy and Mark, to get from one boulder to another among rapids and whirlpools. My comrades hoisted me up on my horse. A faint trail wound through a plateau leading to the foot of the great black volcanic spires of Pico San Nicholas. Our horses hugged the narrow trail at the base of a monolith of frozen lava. They moved forward gingerly as small chips of lava shot out from under their hooves. After a couple of hours, we arrived at a long slope of tawny grass: out of the Andes and into the eastern foothills at last!

We seemed to be nearing civilization as our mounts

As we huddled under sheepskins, a gale mixed with snow came howling into camp and one of our horses, sideswiped by the wind, was blown over.



Rhinolike *Nesodon* was a grazing herbivore in the Miocene.

MAMMALIA OF THE SANTA CRUZ BEDS BY W.B. SCOTT, REPORTS OF PRINCETON UNIVERSITY EXPEDITIONS TO PATAGONIA, 1912

jumped over an old range fence. The worst commute home from work I had ever taken was over. A pickup arrived and I was helped into the back for a bouncy ride to the Hotel Nacional.

Mark Norell (at Pampa Castillo) uncovered Miocene skulls and skeletons.

AFTER SEVERAL DAYS of recuperation, the injured Novacek decided to continue to the second target of the expedition, Mallén Grande. Reaching the destination by boat, the group was warmly welcomed by the local schoolteacher who had discovered the fossils of Mallén. Then things fell apart; the schoolteacher could not accompany the team, the intriguing fossil he had found had been stolen and he could not remember the exact location of its discovery; Daniel, terrified of another journey by horseback, decided to remain behind. But a chance encounter with a local family revealed a new possibility; exciting fossils had been collected in an area called Pampa Castillo. It was agreed that Andy Wyss and Mark Norell, uninjured and reasonably skilled riders, would investigate the thousand-foot bluff on horseback. Novacek and John Flynn took a two-day hike into the mountains, but their effort revealed few fossils. The results were thrilling for the other team; Wyss and Norell uncovered glyptodont bones, the teeth and jaws of rodents, litopterns, toxodonts and various others finds of the kind that earlier bone hunters like Darwin, Hatcher, Simpson and the Ameghinos had fervently sought. The team just told Carlos de Smet and Paul Raty of their discovery so they could return the following year to an untouched assemblage of dazzling fossils.

It was actually a few days less than a year, January 10, 1987, when we pitched a camp at Pampa Castillo. This year we had a slightly larger team. Besides Mark, Andy, John, and myself, we brought along Paul Sereno, a student in the Columbia University–American Museum doctoral program, and Roger Carpenter, a friend and colleague of mine from San Diego State. Joining us at this high camp was Carlos de Smet himself and his young son Olivier, as well as Daniel Frazinetti and René Burgos, our quiet, very professional *baqueano*. In contrast to the chaos and uncertainty of our explorations the year before, the 1987 trek to Pampa Castillo went remarkably smoothly.

As we pitched tents, I took in the panoramic mountain vistas around this lonely place. The massive cliff face of the butte rose over a thousand feet out of the forest. The summits seemed unassailable and the forests below them impenetrable, yet here in the middle of this wilderness was the best fossil bed for land vertebrates yet found in Chile. But getting to the site at Pampa Castillo, even from our high camp, was no trivial exercise. The fossils were exposed nearly a thousand feet higher, up steep, crumbling slopes of hard siltstone and sandstone. That first afternoon, our brief bout of prospecting brought shockingly good results, including shiny blue-black teeth and chunks of mammal jaws. Fittingly, Carlos came back with the find of the day, a superb upper and lower jaw with a set of perfectly preserved teeth that belonged to a notoungulate. That evening we talked excitedly about anticipated discoveries.

The next morning, after a breakfast of hot coffee and greasy *tortas*, we faced the ascent of the butte in the howling wind. My legs were still not altogether fit after the Andean horse accident of last season, and I grimaced in pain whenever I had to scale a boulder. Near the top of the butte, Andy found an entire skull with jaws of a big rhinolike toxodont, well encased in a sandstone ledge.

In the days that followed, we scrambled all over that big butte, extracting skulls and skeletons of numerous strange, herbivorous, camel-like, antelopelike, and rhinolike mammals, as well as armored glyptodonts and rodents. The census of our fossil community revealed that these animals were indeed probably Miocene in age—about 16 million years. We continued our collecting, trying to hold out at the site as long as the weather would allow. There is true contentment in working such a productive fossil site. Each day of quarrying brought its own special treat—a fossil of an animal we had not previously encountered. Within a week we found a real gem—the tiny jaw and teeth of a rare, opossumlike marsupial. There was a prize in every crackerjack box, and spirits were high. We would return from ten hours on the outcrop, shivering cold and wet but happy, ultimately restored with maté and a fire.

Despite our adaptation to the conditions, the changeable weather wore us down. Sunday, January 18, was hot and windless but January 19 began with a snowstorm. On January 22, a day of fair weather, Daniel, Roger, and John packed up and left. Five of us remained, planning to work for several more days. It was not to be. Late on the 24th a cold front came in. We retreated to our tents, and I lay

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there in my own golden nylon dome, listening to the BBC on my short-wave radio. A lovely Brahms violin sonata drifted above me. It rained torrentially from eleven that night until ten the next morning. On the 26th we made a desperate attempt at one last day of fieldwork. But the storm returned. No river in southern Chile could be safely crossed. So again I was forced to take a dangerous ride on a horse, a means of transportation for which, even under normal conditions, I had lost some fondness. The trail was now a narrow ribbon perched over steep muddy slopes. After four hours the worst of it was over.

Novacek was thrilled to find mammal fossils that had eluded Charles Darwin.

When we reached the Chacabuco, René gasped in amazement and laughed. The peaceful river we had forded only three weeks before had become a raging torrent a quarter-mile wide. Rapids with standing waves several feet high seemed to carry all the flotsam and jetsam of the southern Andes—huge beech logs, the siding of a former riverside cabin, the bloated carcass of a cow. I asked René how long it would take the river to fall to a navigable level. "*Tres días*," he murmured, shaking his head. He knew that forecast held only if the weather vastly improved.

"He's goin' for it!" Mark exclaimed. I couldn't believe it. René reasoned that a river that could drown a human on foot with dispatch might still have a line of weakness for a mounted crossing. We watched him pull hard on his horse and disappear in the maelstrom, then reemerge on our bank of the river. Clearly the water was too deep.

Then René rode about a mile down the riverbank. As we approached this spot we could see he had made it about halfway across. The horse carefully weaved a path from one submerged bank to another. It would emerge on a shoal, dripping with mud and icy water, then suddenly plunge into the next channel up to its neck. It took René fifteen minutes to make the slalom to the other bank, and then he crossed back. "*Vamanos*!" he shouted, with more urgency than triumph. The river was still rising.

What followed was a horrible fifteen minutes. As we plunged into the first torrential channel, I could hear the nervous grunts of the horses and the sound of rocks cutting loose on the river bottom. We all made the crossing. On reflection, one might question René's decision to put his clients at such high risk. But this was after all a frontier, and he was our hero. He successfully brought us back in one piece and on schedule. The southern end of the riverbank was a paradise. A warm sun dried our sweaters and anoraks.

The rest of our journey home was without incident. We carefully packed the fossils for transport in our luggage and talked about plans for next year's expedition. News of our success had preceded us, and back at the museum in New York I was assaulted with questions about our discoveries from colleagues. As noted, the animals—the glyptodonts, bulky toxodonts, hoofed, long-legged notoungulates, marsupials, and rodents—were familiar components of Miocene-aged faunas from Argentina. But this was the first time such a classic assemblage had been found at a 10,000-foot elevation deep within the Chilean Andes. Marine rocks just below the bone-bearing sequence indicated that this was an ancient shoreline, one that had seen a remarkable rise in elevation in the last 16 million years. Indeed, our work at Pampa Castillo supported the theory that the Andes were among the fastest-growing mountains in the world. The *New York Times* went a bit far with this connection in an article headlined "Whale Fossils High in the Andes Show How Mountains Rose from Sea." A letter to the editor that otherwise gave much credit to the find wryly asked, "Where else would they have come from?" Nonetheless, our discoveries were important on many fronts. Perhaps most significantly, they showed the exciting potential for unearthing fossils of ancient mammals, dinosaurs, and other land vertebrates in little-known and unlikely territory. A mountain chain several thousand miles long awaited further exploration.

Each day of quarrying brought its own special treat—a fossil of an animal we had not previously encountered. There was a prize in every crackerjack box.

ANDY WYSS

PRESENCE OF MIND

October Surprise

ANY OTHER YEAR, GIVING REACTIONARY AUTHOR V. S. NAIPAUL A NOBEL WOULD HAVE SPARKED DEBATE

BY PAUL GRAY

THE ANNOUNCEMENT THAT THE Trinidadian-born author V. S. Naipaul had been awarded the 2001 Nobel Prize in Literature came only 30 days after the events of September 11. Those who would ordinarily have taken an interest in this decision by the Swedish Academy were, like nearly everyone else, still blindsided by shock, grief and fear; press coverage of Naipaul's laureate felt perfunctory and cramped, hemmed in by the crush of breaking news. What would certainly, in a normal October, have prompted a fractious literary and political controversy was swamped by events.

Naipaul (in England in October): Did the members of the Swedish Academy understand the prickly author's views about the supremacy of the West, or did they choose to misread him?

CHRIS ISON/REUTERS

It may yet erupt, given time. For Naipaul is the first Nobel author in many years with whom it is possible for readers and critics to disagree: not just about whether he is good enough to deserve the prize (the usual, bootless debate over academy choices) but about his central interpretation of the world. Had he stuck to the novels on which his reputation grew during the 1960s and '70s, Naipaul could claim immunity from all but aesthetic judgments of his work. But he began devoting ever more of his time and energy to nonfiction, to recording his travels through the postcolonial worlds of Africa, South America and India, the home of his ancestors. Born in a backwater of the British Empire, Naipaul wanted to see what people newly liberated from European dominance would make of themselves and their societies. He hoped to bring a novelist's eye to a vast story with a cast of hundreds of millions unfolding in real time: "I have no unifying theory of things," he has said. "To me, situations and people are always specific, always of themselves. That is why one travels and writes: to find out."

What he found out, and recorded in book after book, appalled him, and many critics: "The new politics, the curious reliance of men on institutions they were yet working to undermine, the simplicity of beliefs and the hideous simplicity of actions, the corruption of causes, half-made societies that seemed doomed to remain half-made. . . ." Outsiders, of course, were not supposed to say such things about the Third World. Western liberals had developed a new orthodoxy—cultural relativism—which outlawed judgments of one society based on the standards of another. Naipaul evidently missed this news. In 1979, prompted by the revolution in Iran, he began traveling through non-Arab Muslim countries, tracking the eastern spread of Islamic fundamentalism though Iran, Pakistan, Malaysia and Indonesia. In the book that followed, *Among the Believers* (1981), he unembarrassedly referred to "The West, or the universal civilization it leads" and argued that the rejection of Western values is "a way of ceasing to strive intellectually. It is to be parasitic; parasitism is one of the unacknowledged fruits of fundamentalism."

Such assertions of cultural supremacy are anathema among educated Westerners. Did members of the Swedish Academy understand just how reactionary Naipaul's views are, given the current climate, and then courageously

award him the prize anyhow? It would be pretty to think so, but the evidence suggests that the members misunderstood or misread Naipaul's message. The Nobel citation singled out the author's novel/memoir *The Enigma of Arrival* (1987) for special praise and described it as "an unrelenting image of the placid collapse of the old colonial ruling culture and the demise of European neighborhoods." This summary suggests that Naipaul is somehow celebrating that colonial "collapse" and "demise" from the perspective of a onetime outsider who has lived to see the interments of the old oppressors.

The burden of this melancholy book is precisely the opposite. Having made the physical and intellectual journey from Trinidad to England, "traveling," as he has often described it, "from the periphery to the center," Naipaul settles in a cottage on an estate near Stonehenge and then watches as, over the years, the landscape and society around him decline and diminish. *The Enigma of Arrival* is not a celebration but a dirge for a vanishing order that Naipaul loves.

Defending Naipaul isn't always easy; even his champions sometimes find him unsympathetic. His comments on other writers have tended toward the vitriolic, whether he is assailing the "nastiness" of E. M. Forster's homosexuality or dismissing the author of *Ulysses*: "Joyce was going blind and I can't understand the work of a blind writer." After a friendship of 30 years fell apart in 1996, Paul Theroux wrote a stinging denunciation of his former mentor in *Sir Vidia's Shadow*. Theroux's Naipaul emerges as egotistical, stingy and given to racist slurs, in private referring to Arabs as "Mr. Woggy" and Africans as "bow-and-arrow men."

Assuming this is accurate: So what? Great writers need not be, indeed regularly aren't, nice people. It is through his books that Naipaul's true value emerges: through the supple, unobtrusive power of his prose, through the accumulation of scrupulously precise details into a pattern of aesthetic and moral authority. If he is thoughtless or cruel in his personal dealings, he always treats the people in his books with respect; he manifestly wants for them the best they can make of themselves and grieves when he senses that they will not succeed in transcending their constrictions.

Finally, Naipaul has undertaken arduous journeys that most of the rest of us will not or cannot make. His reports back from these remote regions may have angered those who saw jingoism in his advocacy of Western values: the Enlightment ideals of the free play of inquiring minds and the disinterested pursuit of the truth. Without a hint of modish irony, Naipaul said of the notion of the pursuit of happiness that "it fits all men. . . . It is an immense human idea." Those who found his views uncritical or naive might, in the aftermath of September 11, want to take another look.

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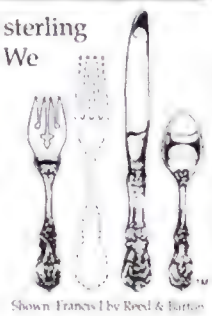

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PEOPLE FILE

Skunk Man

JERRY DRAGOO IS UNIQUELY QUALIFIED FOR HIS STINKY JOB

BY STEVE KEMPER

Researcher Jerry Dragoo goes nose-to-nose with a resident of his backyard named Pete. Like other spotted skunks, Pete can stand on his forefeet and sometimes does so for fun.

JOHN MACLEAN

THE FIRST TIME I MEET JERRY Dragoo, he doesn't stink. That will change, but at the moment, sitting in his office at the University of New Mexico in Albuquerque, he seems like just another assistant professor of biology dressed in jeans and cowboy boots. Except that his Western belt buckle, instead of displaying the usual turquoise or embossed-silver design, depicts a spotted skunk standing on its forelegs.

The buckle signifies Dragoo's passion. He studies skunks; his research has changed science's view of them. He rescues, rehabilitates and relocates skunks. He responds to half a dozen e-mails every day from all over the country asking about skunks. (Question: "My pet skunk tears up the carpet. What should I do?" Answer: "Put down tile. Skunks are diggers.") When Dragoo goes home at night, he lives with skunks—four in his backyard, three in his house. All of them are fully loaded, and they occasionally discharge their weapons in the living room. "My wife has a problem with that," Dragoo admits.

Though skunks are one of the most recognizable animals in America, the field of skunk studies is not crowded. Notwithstanding such beloved cartoon and film characters as Pepe Le Pew and Flower (Bambi's friend), real skunks do not show up on any favorite-critter lists. Yet in the 1800s and early 1900s, skunk fur was prized by clothiers and was often marketed as "Alaskan sable."

Jerry Dragoo is genetically outfitted for intimacy with skunks. Now 40,

he remembers the day he discovered his fated field of study. As an undergraduate, he was drawn to the mustelids, the carnivorous weasel family that includes badgers, otters, minks and wolverines. "Small ferocious animals," he says. "I liked that, being kind of small myself." The mustelids also included a mild-mannered oddball (a description that also fits Dragoo), the skunk.

When a professor asked Dragoo to research spotted skunks, he was a little disappointed. After capturing his first one in a wire live trap, he sat there making field notes. When he rose abruptly, he felt a drizzle. He looked up. No clouds. He looked down and saw oily yellow spots on his notes. Olfactory data. He sniffed tentatively, but didn't smell anything. "And I thought, 'Why do skunks have such a bad name?' But three days later, when I came back to school, they kicked me out of the building." Dragoo, it turns out, has almost no sense of smell. He had found his calling and has pursued it ever since.

Soon after arriving at Fort Hays State University in Kansas, where he got his master's degree in biology, he skinned a road-killed skunk. The department chairman quickly got wind of it and phoned in his reaction: "You will not skin skunks in this building." Dragoo got the same indignant order shortly after starting work on his doctorate at Texas A & M, where he studied, among other things, hog-nosed skunks. By then he was fearless. Instead of collecting his research animals with traps, he was running them down and grabbing their tails, with predictable consequences.

"People ask how many times I've been sprayed, and I tell them six or seven." He pauses. "Per animal." Not long ago a hooded skunk nailed him nine times in less than ten seconds, a feat that filled him with admiration. Do his colleagues find him hard to work with? "I've heard that," he deadpans. He has been kicked out of meetings, shunned in public places and evicted from apartments. "If people smell a skunk and I'm around," he says, "I get blamed. Most of the time I'm guilty. But not every time," he adds, his tail up a little.

A NEW BRANCH ON THE TREE

THE BUSINESS END OF A SKUNK FEAtures two nipples located on either side of the anus. These are the weapons that fire the skunk's musk. The nipples are flexible and can be aimed like antiaircraft guns. Although a skunk's vision isn't great, it won't miss if its attacker is within ten feet and visible. Skunks aim for the eyes.

Dragoo's major contribution to skunk studies stems from his work as an evolutionary biologist. He's interested in the genetic differences and similarities among related species, which helps explain how they are related. In the early 1990s, he began sequencing particular genes in skunks and other mustelids to see how the subfamilies overlapped.

"But I couldn't get the skunks to group with the mustelids," he says. Assuming that he had done something wrong, Dragoo started over but got the same results. That's when he realized that at some point millions of years ago, North American skunks (striped, hooded, spotted and hog-nosed) and the Asian stink badger had branched off from the tree of life to form their own distinct family.

A new family classification is rare, so Dragoo's 1997 paper, coauthored by Rodney Honeycutt of Texas A & M, created a stir. Says Don Wilson, senior scientist and curator of mammals at the Smithsonian's National Museum of Natural History: "The molecular evidence is pretty convincing."

Now Dragoo is applying for funding to study the ecology of rabies in skunks. Skunks are a major carrier of the disease, but Dragoo says animal-control officers and homeowners are more frightened of them than they need to be, since not all skunks are

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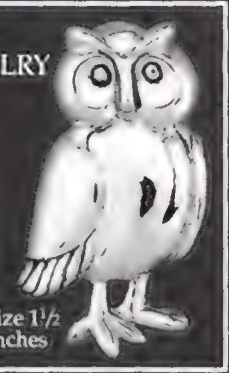

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rabid and rabies is treatable. This spells big trouble for many innocent animals. Dragoo cites a baby skunk that some children found in their yard and spent time petting before he was called. The local animal-control officer then insisted that Dragoo turn it over to be killed and tested for rabies. The results were negative.

BE PATIENT, THEY'LL LEAVE

EACH YEAR BETWEEN MAY AND SEPtember, when adult female skunks and their litters forage widely, Dragoo gets calls from homeowners who want to know how to get rid of them. He has heard of people trying mothballs, loud music, or rags soaked in ammonia to encourage skunks to leave. But he tries to convince callers to be patient, because skunks are fun to watch, they won't spray unless they feel threatened (and even then they usually try to escape first), they eat lots of mice and bugs, and they usually move on.

When nuisance skunks are trapped, injured or orphaned, Dragoo is often asked to get them. He drives the captured animals to his house in Tijeras—his station wagon carries an unmistakable tang—and puts them in one of the large holding cages in his backyard. He and his profoundly tolerant wife, Gwen, who is the head veterinary technician at the Albuquerque Biological Park, fatten young animals for a month or two on fruit, vegetables, eggs, tuna, a little dog and cat food, yogurt, cheese, an occasional frozen mouse, cereal, tomato hornworms, moths and June bugs that stray into the house, and anything else that comes to hand. Skunks, to state the obvious, are omnivores, though they do draw the line at lima beans.

When independence day rolls around, Dragoo lets the animals go in the nearby Cibola National Forest. But first they must be caught. "Hi, kids!" Dragoo says. "Who wants to be first?" He grabs one by the tail and puts it in a pet carrier. The cage's other resident runs from Dragoo, sometimes hissing or charging forward, then stamping its front feet. As Dragoo closes in, this striper whirls and squirts. Bull's-eye! But Dragoo, unfazed, grabs it by the tail and stuffs it into the carrier. "I'm happy when they spray me," he says, "because that means they have some fear of humans."

He captures the last two without incident. En route to the forest, the skunks are silent and, more important, odorless. Dragoo is neither. "You stink," Gwen says amiably. The smell coming off him, acrid and almost palpable, contains a hint of horseradish. Gwen says it reminds her of gasoline. Dragoo grins and says, "Rose petals."

As for the seven permanent residents at the Dragoo place, the four who live outside are called Charlie, Stinky Pete, Bugbane and Rosebud; the three indoor skunks are Siren, Shadow and OnRéy.

SKUNKS AROUND THE HOUSE

DURING THE DAY, THE HOUSE SKUNKS sleep in cabinets beneath an aquarium or in bookcases flanking a mantel chockablock with skunky figurines. On the night I visit, the cabinet doors thump as the skunks enter and exit. All the lower kitchen cabinets have hooks to prevent rummaging. The skunks sometimes get into dressers and throw out all the clothing. "When they figure out the refrigerator," says Dragoo, "we're in trouble."

Gwen scoops up OnRéy so I can pet her. Her hair is coarse and shiny, she's shaped like a furry football and her eyes sparkle. I overcome the defensive mechanism built into my genes eons ago and admit that she's pretty.

I'm still not ready to join the incipient Dragoo Institute for the Betterment of Skunks and Skunk Reputations (www.dragoo.org). Maybe I never will be. But I am glad to know Dragoo is out there, running down skunks, figuring them out and stinking to high heaven.

GERMS: Biological Weapons and America's Secret War

Judith Miller, Stephen Engelberg, and William Broad

Simon & Schuster, $27

WHEN JUDITH MILLER REACHED FOR her mail on October 12, her attention was focused on a financial story, not germ warfare, a subject she had spent years investigating as a reporter for the *New York Times*. But suddenly, biowarfare was in her face—literally.

As Miller later explained to *Times* readers, "Had I not been distracted, I probably would not have opened the stamped letter in the plain white envelope with no return address." But open it she did. A talc-like substance spilled out, "dusting my face, sweater, and hands." Soon, moon-suited technicians converged on the newsroom. Tests for anthrax were negative. But the incident brought home the terrifying scenarios that Miller and two *Times* colleagues, Stephen Engelberg and William Broad, explore in an all too timely book, *Germs: Biological Weapons and America's Secret War*.

Clockwise: Miller (left), Engelberg and Broad.

In 1997 the authors set out to investigate why the government was preparing to vaccinate U.S. troops against deadly anthrax. Their research uncovered a buried history of military work on infectious organisms, cultivated for the sole purpose of killing or incapacitating an enemy. Few government leaders have acknowledged this black art, much less offered a rationale for funding it, though germ warfare budgets continue to expand. Like it or not, the authors contend, we must come to grips with this secret history and guard against its implicit threat.

They begin by describing a little-reported 1984 biological attack on residents of Wasco County, Oregon. Followers of a cult leader known as the Bagwan Shree Rajneesh had clashed with authorities over the Bagwan's plan to expand a communal ranch. The issue was up for a public vote; cult members, the Rajneeshees, hatched a diabolical scheme to brew salmonella and sprinkle it in local food supplies to sicken voters (most of whom opposed the cult) and keep them away from the polls. (A preelection test run made 751 people sick.) But the Rajneeshees suffered an internal split before the election: the plot was foiled. In 1986 a handful of perpetrators were caught; two served brief prison terms.

Next, the authors focus on Russian and U.S. investments in bioweapons. This country built a massive arsenal that included anthrax, smallpox and botulinum toxin. President Nixon unilaterally halted this program in 1969, ordered the stocks destroyed (which they were but for a small arsenal held secretly by the CIA) and invited the Soviet Union to follow. The Soviets agreed publicly but privately invested in bioweapons on a mind-boggling scale. Their deadly stockpile grew to include hundreds of tons of smallpox, anthrax and plague germs.

Now the weapons developed by the United States and the former Soviet Union have spilled over to the less-developed world. The grim conclusion: "We remain woefully unprepared for a calamity that would be unlike any this country has ever experienced."

Eliot Marshall, based in Washington, D.C., is an editor and writer at Science.

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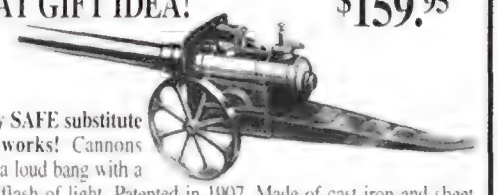

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Eureka!

FELL SWOOPS AND STUBBORN MOLARS

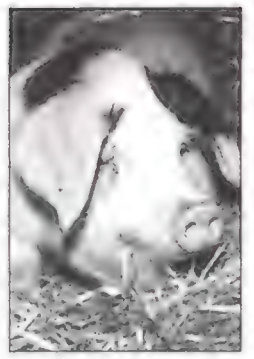
BY GEORGE KALOGERAKIS

For this department, a distinguished writer is asked to read the magazine's articles before publication and to comment or elaborate on them or take issue with them.

AS CONVERSATIONAL GAMBITS GO, the incredulous, brow-clutching "How on earth did you end up doing that?" has always struck me as woefully underused. Which of us has not asked more couples than we care to remember, "So, how did you two meet?" and, as for the numbingly predictable "And what do you do?" we've all been on both the giving and receiving ends of that one on an almost daily (or nightly) basis.

But the whys and hows of true vocational passion can take some digging, just as the rewards—those telling moments on which lives are turned—can be revelatory. This issue contains glimpses of several. For Professor Jerry Dragoo, the University of New Mexico mammalogist profiled in "Skunk Man," the career path (all things skunk) appears to have presented itself not in one fell swoop but, well, two fell swoops.

The clincher was, as Professor Dragoo describes it, getting tossed out of a university building as an undergraduate for reeking of skunk. His



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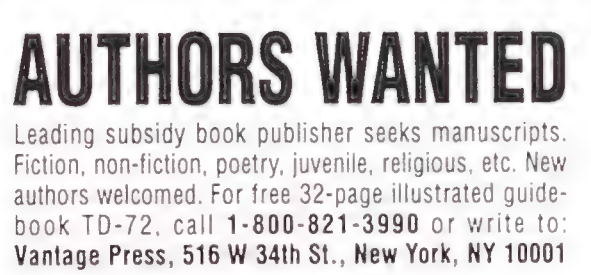
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happy obliviousness to his aroma turned out to match his new calling perfectly. Still, plenty of people with an impaired sense of smell find gratification in rather different fields. In the professor's case, the olfactory deficiency had to be combined with a preexisting interest in "small, ferocious animals" (his words) in order to send him in the life-changing direction. The undergraduate Dragoo, we learn, was "drawn to the mustelids"—a carnivorous weasel family. How many acquaintances can you confidently describe as "drawn to the mustelids"? (How many would you even peg as mustelid buffs?) In short, we are talking about a select group indeed—especially when further reduced to those with a sniffing disorder—to produce a single brilliant career.

In Rudy Chelminski's piece on Sweden's Icehotel ("Cold Comfort"), we encounter Yngve Bergqvist, a "reformed engineer" running a hotel in Jukkasjärvi. The article describes how a slow season and a friend's suggestion led Bergqvist to build an igloo to house an art exhibition, build a bigger igloo, expand that facility, and then start taking in paying guests. Then, as Chelminski writes, somewhere along the way "a lightbulb lit up over Bergqvist's head." To ensure that this bulb didn't turn the best rooms in the house into puddles, the hotelier engaged an Englishman named Mark Armstrong, "one of only a handful of experts in the understandably limited field of meltable architecture." (Sadly, we don't learn here precisely how Armstrong made his way to meltables.)

The tangle of trails that might lead someone to devote himself to the study of skunks or to the running of hotels made of ice is faint indeed. But the road map that leads one to the examination of holes in the desert probably doesn't exist at all. Pinau Merlin, the naturalist of "Tunnel Vision," definitely drew her own, with a little help from fate. A trip with friends to

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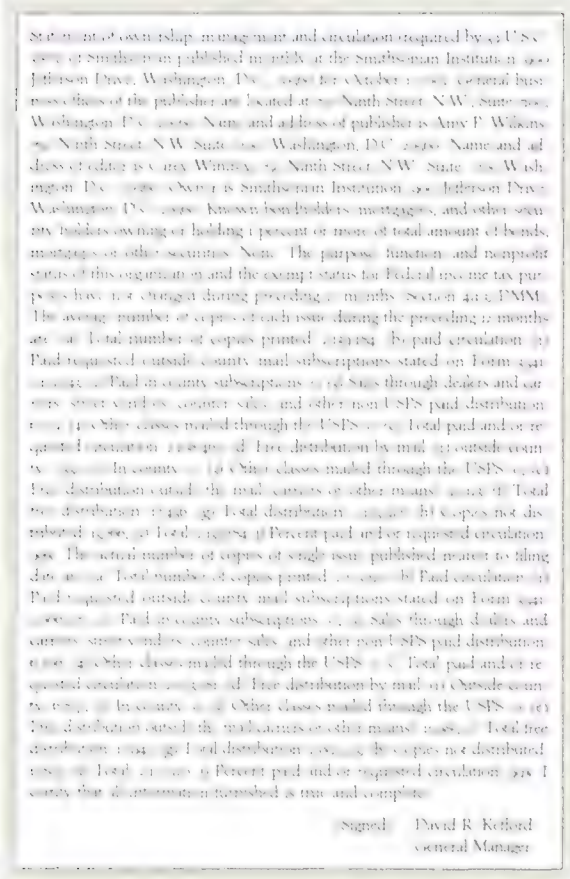
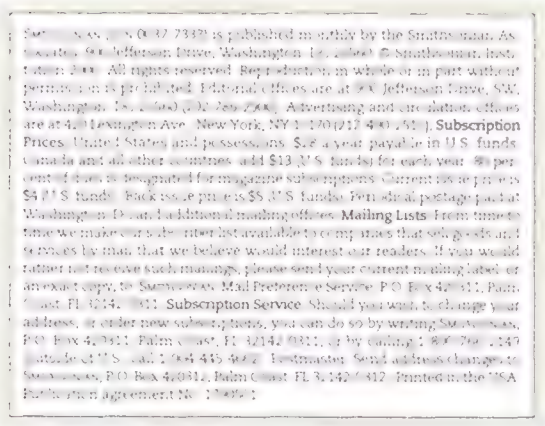
Arizona's Sierra Anchas not only quelled Merlin's fear of "cows that bite" but transformed her into a camping and hiking enthusiast. As with Dragoo, however, that bit of serendipity had to combine with another—in this instance, Merlin's disaffection with her job as an ER nurse, which turned her to full-time writing and led her to move to a remote ranch. Only then did her true calling—hole-ologist, if you will—emerge.

Western novelist Zane Grey must have had his eureka moment, too, though in "Writer of the Purple Prose," it's a moment more implied than stated. We learn that Grey's dentist father tore up a story the 15-year-old Zane had written, and that Grey dutifully followed him into dentistry, opening an office on Manhattan's West Side. Grey continued writing, eventually gave up dentistry, and later found enormous popularity as a novelist. The turning point—or one of them—might have been the retreat Grey took to Arizona (What is it about that particular state?) that sparked his imagination. And while the catalyst for his career appears to have been his determined wife, Dolly Roth, one likes to imagine that it was something more than the love of a good woman that did it. A particularly uncooperative molar, for instance—wouldn't that be nice? Because when it comes to major, life-altering detours, no little road sign is too insignificant, minor or absurd to celebrate.

George Kalogerakis is a contributing editor at New York *and a contributing writer at* Talk.





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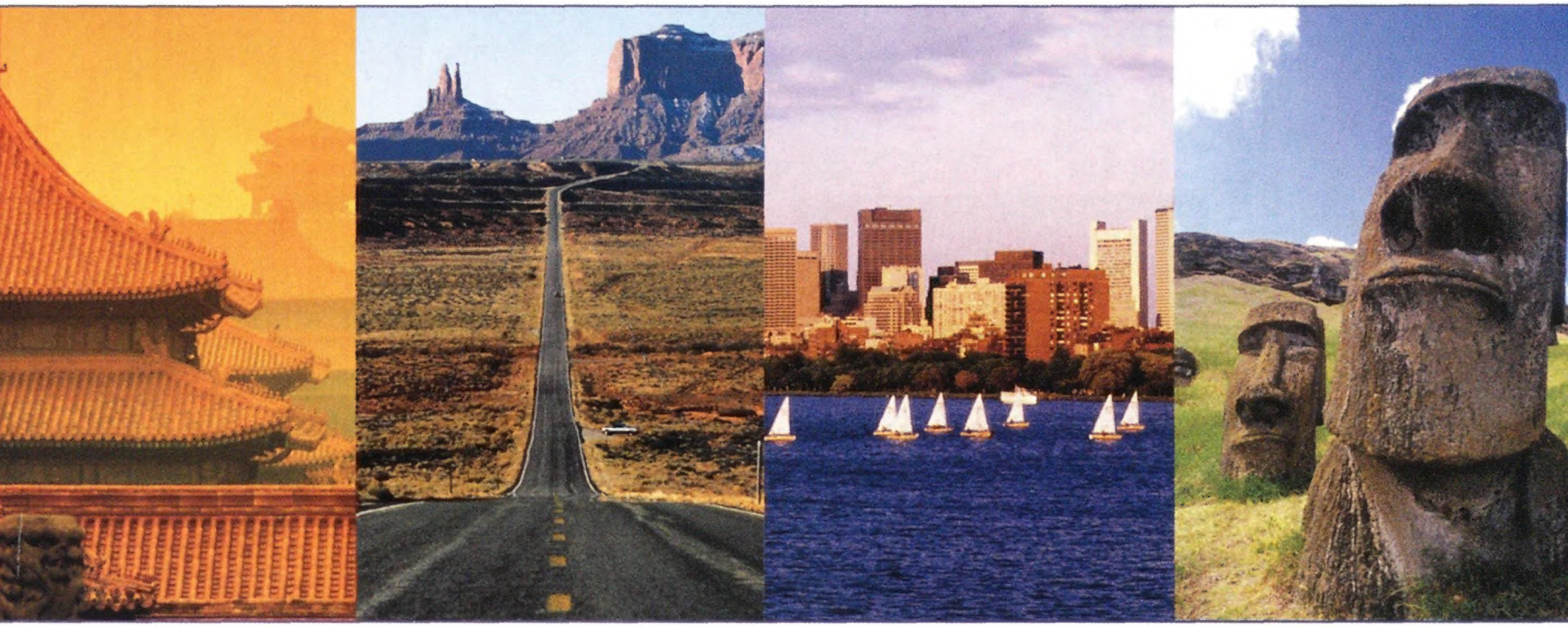

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PHOTO FINISH

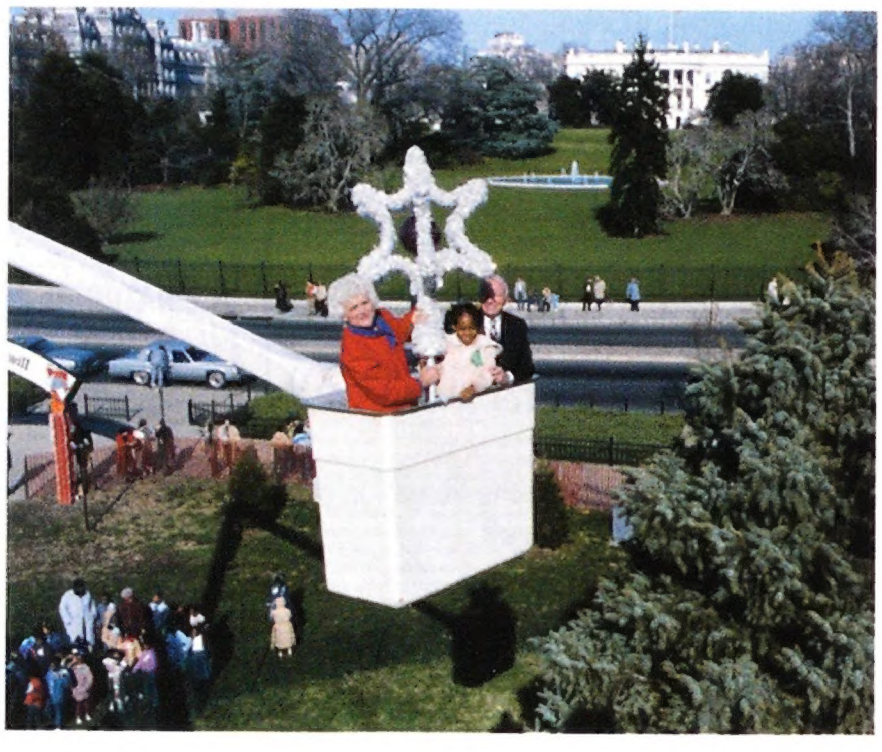
Tree Time

A PAGAN SYMBOL TURNED YULETIDE ICON, THE CHRISTMAS TREE HAS ALSO BECOME A CHERISHED PROP FOR PHOTO OPS

Rock Hudson pursues Jane Wyman in 1955's *All That Heaven Allows*.

George Foreman has a present for Joe Frazier in 1972.

A festive and trim Elizabeth Taylor is all decked out in 1954.



Veep's wife Barbara Bush "stars" at the White House in '83.

Jimmy Stewart towers over Margaret Sullavan in 1940's *The Shop Around the Corner*.

CLOCKWISE FROM TOP LEFT: KOBAL COLLECTION/UNIVERSAL; KOBAL COLLECTION; KOBAL COLLECTION/MGM; BETTMANN/CORBIS (2)

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